# 'Interdisciplinary research can be conducted in remote areas

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IIT Mandi was set up in 2009 and completes 10 years of existence this year. The institute was among the first institutes to offer reservation for women candidates. In a conversation on how far the institute has developed since its inception, Prof. Timothy A Gonsalves, director, IIT Mandi shares what sets apart the IIT from others. Edited excerpts:

**You have been leading the institute since its inception in 2009. What has been the experience of leading an institute for a decade?**

Looking back feels good – there have been a lot of challenges but a lot of satisfaction. Just to put it in perspective, when we started about 10 years ago, there were 97 students and one director. Today, there are close to 1300 students, faculty and staff, nearly 900 alumni, including about 70 PhDs. And a large amount of research funding, that is 80 crores which is about 85 lakhs per faculty member. In many ways, this figure is on par with the best. So essentially from starting on a Greenfield, we have built a full-fledged IIT and our alumni have gone on to some of the best companies and the best universities. One of the things when starting a new institution or even a start-up is that you have to have a USP, some reason why someone would come to it. The USP we have first students is that we have a project-based learning – we have completely redesigned the B tech curriculum. So from the first year to the fourth year, we have students work on team projects wherein they take the problems of society and learn how to come up with solutions. In first year, they do reverse engineering, which is taking a ceiling fan or mixie, dismantle it, understand how it works, re-assemble it, and so on. In the second year, they do product development even though they have very little non-technical knowledge. In the third year, they do a detailed marketing impact survey; typically they got into villages around it and see the impact of new technologies on village life. In the fourth year, they do a traditional major technology discipline.

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> TIMOTHY A GONSALVES, director, IIT Mandi

From this year, all our undergraduate students across branches, they have three courses in machine learning in their first three semesters. IIT Mandi is the first institute to do this in India. Traditional institutes are divided into departments and faculty members barely interact with each other. So we don't have departments but faculty offices where a chemistry professor is sitting next to an English professor. This is also why faculty members are attracted to this institution. Most of the faculty works collaboratively and do experimental research despite being in a remote area. Another important area is bioX where the X stands for biology's interaction with engineering and physical sciences.

This is a group of 22 faculty members who are focusing on themes like the agricultural practices in the Himalayan region, the environmental needs of people and affordable health care. DBT started an important initiative called the Farmers' Zone to focus on causes of agricultural distress. The idea here is that collect that we collect a lot of the raw data from weather data, soil conditions, market prices, and others, then we make it available as in the cloud as a public utility, and then use AI artificial intelligence techniques based on that data to deliver top management advisories to farmers. By taking very localized weather information, we will be able to share data on how they can make more money. IIT Mandi is leading this project with other partners in the US and UK.

**What are the challenges in leading a newer IIT?**

The first challenge for a number of years was for people to take us seriously. This was a new IIT in the mountains and people would often look down upon the institution thinking not much could be done there. Through our accomplishments we have proven that things can be done in this geography too. In the first few years, it was very difficult to get good faculty to come to it. Many people would be attracted by the location but would eventually take up an offer in bigger cities. But in the last few years, some great teachers have opted to teach at Mandi over the older IITs. To a certain extent, this challenge remains today. Often spouses of highly qualified faculty members have a difficult time finding jobs so we have to be innovative about the opportunities we offer. The other issue is the time it takes to travel to Delhi. There is road connectivity and just one flight a day to Kullu and often the timing is not always convenient. But we always tell that a remote location is an advantage as all visiting guests and faculty members spend significant time at the campus engaging with all stakeholders.

**What is the primary purpose of an IIT? Has their relevance changes over the years?**

IITs were set up to essentially to be the leaders for science and technology for the nation in the process of nation-building. That was a very general goal. They started out by providing education at the undergraduate level which was the need of the hour. Over time, they started doing Masters and PhD education. Then from about 1980s onwards, research became important goal and to be known internationally, you had to be good at research. From the 1990s onwards, particularly starting with IIT Madras, there's an emphasis on integration of companies which can effectively make commercially viable technologies, and incubating companies. So, the IITs have been evolving over the years in order to meet the expectations of India.

Thus, IIT Mandi also wants to be in the service of the country. Fom the beginning, we focus on teaching students who will become the leaders of the future. If we see that data science is a need for the future, then we teach it all our students. Today, you don't really need to have a teacher to teach you something, what you need is a good problem, and the ability to figure out where to get the information to solve that problem. It's important to focus on creating problem-solvers for the future as the technology and knowledge relevant today may be of no use 10 years later. So a student who is an electrical engineer today might decide to become an IAS officer after five years, and then decide to join some industry or go into politics. At every stage, we want them to be a leader and contribute to problem-solving. The other aspect is that we want to contribute in developing useful science and technology for the country too.

**The future of work reports suggest that employment and skills will change in the future. How does an educational institute prepare students for lifelong learning when the future is so ambiguous?**

Over four years students work towards 260 credits – roughly half of that is broad-based and the other half is in-depth traditional discipline. This is different from other traditional colleges and we do so to ensure that as jobs change unpredictably, students will have the basic knowledge that will help them in every job. They need to have the skills that allow them to identify what they need to devise a solution to a problem in any discipline.