

# How far does a PhD go?

T Pradeep

**As the job market is tight for those with PhDs in science, it is important that they develop other skill sets**



The number of PhD graduates has proliferated over the decades — while there were only a dozen doctorates till 1920 in India (the first was awarded in 1904), there were 24,000 in all disciplines from about 900 institutions in 2017. While the number may not be surprising, what is disquieting is that of the 6,000 people granted science PhDs annually, not even 2,000 find decent employment today.

### **More doctorates, less positions**

Let's look at the numbers. There were 326 PhD-awarding institutions in 2000; this rose to 912 in 2017. According to the University Grants Commission and the Department of Science and Technology, the number of science PhD holders tripled in the same period. With the number of PhD holders surpassing the number of opportunities created, many are left without jobs.

The top-ranked universities in India grant around 2,500 science PhDs each year. In chemistry alone, the Indian Institute of Technology (IIT)-Madras grants over 25 PhDs every year. The number is similar in the older IITs, which means that there are 150 chemistry Ph.D.s from these IITs every year. The remaining 11 newer IITs (the latest six are not being considered) add another 100 PhDs. The National Institutes of Technology (NITs) account for about 150, the Indian Institute of Science (IISc) for about 25, the older Indian Institutes of Science Education and Research (IISER) for about 60. The Council of Scientific and Industrial Research (CSIR) labs and institutions of the Department of Atomic Energy (DAE) add another 100 PhDs. Top universities produce about 250. In all, we have more than 800 chemistry PhDs a year.

However, our capacity to employ them is dismal. On average, the IITs and the IISc together recruit only about 25 chemists to their faculty in a year. The older IITs are saturated, so recruitment is rare. Another 50 are recruited in the CSIR, the DAE and the NITs. Overall, the annual intake is not more than 75. If other research labs, the IISERs, and top universities employ about 100 PhDs, that still leaves over 600 chemists without reasonable employment. Options for them include recruitment into State universities, colleges and private institutions, but it is important to remember that these institutions also produce PhDs, whom we have not counted. This has led to a situation where there are over 300 applicants for one faculty position alone. The situation is nearly similar for physics and worse for biology. Those with PhDs in mathematics fare better. Engineers have not faced this challenge yet.

Thus, after earning a PhD and completing one or two postdoctoral stints, a scientist often stands at a crossroads after the age of 30. This unfortunately happens even to those who have published papers in respected journals and have obtained globally renowned fellowships. The only reasonable option for those with science PhDs seems to be the position of a permanent

postdoc in foreign labs. Finding underemployed Ph.D.s who have completed four postdoctoral fellowships is not uncommon. After 40, they are not accepted in entry-level positions.

### **Science, funding, and productivity**

The vicious cycle continues because a scientist's performance is evaluated largely based on some standard criteria: in order to get the first promotion, he/ she has to publish five to 10 papers, and at least one PhD student should graduate under his/ her supervision. Awards and fellowships are also given based on such criteria. As a result, scientists end up training more scientists.

A big problem for scientists is funding, which is mostly provided by the government. Funding is crucial for good scientific research. Further woes for scientists include the fact that available resources are not distributed properly, funds are pruned, delayed, or stopped altogether.

While the government pays well, an Assistant Professor in a self-financed college in southern Tamil Nadu is paid just ₹8,000 a month. Many private colleges in and around Chennai pay about ₹30,000 for a person who holds a science PhD with postdoctoral training. In established private companies, barring exceptions, a post-doctorate is paid ₹70,000. There is indeed an oversupply of candidates.

A job in academia is the most desired, as many industries have not developed adequately to absorb highly trained personnel. While employment opportunities do exist in corporate research and consultancy, about 60% of IIT-Madras' PhDs are in academia. Corporate research and development provide employment to only 10%. It is important for PhDs and post-doctorates to have other skill sets to be employed in business incubators, industry, journalism, and patenting offices. Available positions must be filled quickly in academia. It is crucial for the PhD to regain its respectability.

*T. Pradeep is an Institute Professor at IIT Madras. Email: [pradeep@iitm.ac.in](mailto:pradeep@iitm.ac.in)*

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