Human resource development in biotechnology

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Human resource in biotechnology meets creative thinking and advanced knowledge of the field. Programmes that impart both industrial training and research aptitude alone can provide suitable manpower for this unique industry. Therefore a concerted effort from all stake holders in general and DBT in particular is needed to make this programme a success in India.

Keywords: Biotechnology, entrepreneurship, human resource development, industrial needs, teaching programme.

Introduction

THE earliest programme of the National Biotechnology Board, the predecessor of the Department of Biotechnology (DBT), Government of India, has been the M Sc biotechnology teaching programme started in five different Universities in 1985. These universities – Jawaharlal Nehru University (New Delhi), Madurai Kamaraj University (Madurai), Banaras Hindu University (Varanasi), M.S. University (Baroda), and Pune University (Pune), were selected based on their teaching capabilities and available infrastructure. Indeed this programme predates similar ones started in the developed countries. This reflects the mindset which prevailed at that time regarding the dire need of well-trained students. In order to impart quality education in this emerging discipline, trained faculty had to be recruited and this formed the parallel objective of the teaching programme. The programme has objectives in addition to training talented students in biotechnology, which was the main reason behind starting the programme. The augmentation of infrastructure facilities went hand in hand with new faculty recruitments. Those were the halcyon days of faculty recruitment. Department Heads gave the biodata of suitable candidates and got the green signal to hire them without any personal interview or other impediments. Induction of competent faculty with adequate facilities and conducive education-friendly environment were the main reasons for the success of this programme. Hence, bright students opted for this course and even came to remote areas such as Madurai from all over India. The competence of the teaching was reflected in the students clearing the National Eligibility Tests with ease. A small number also ventured into starting entrepreneurial activities and succeeded as well. Creating creators is a tough task and even today, some obstacles for effective start-up operation are yet to be addressed.

Lack of monitoring and dilution of faculty competence, reduced numerical strength of teaching faculty and above all the dismal deterioration of educational environment in many institutions led to the decline of quality, not only in this, but in several other teaching programmes as well. This is unfortunate, especially now because the industrial climate is getting better and establishing new start-up companies is relatively easier. Above all, we have serious competition from other countries as well in the education sector. Unless we remedy this situation, we will be losing talented young minds from India.

The initial push to evolve a curriculum that reflects the new way of teaching biotechnology, was developed in a four-day workshop involving experts from various areas of basic research, health science, agriculture and industries in 1986 with S. Ramachandran as the chairman, who subsequently became the first secretary of DBT. The basic framework that evolved in 1986 still holds good. Imparting advanced scientific knowledge and at the same time instilling aptitude to application was the motto. Many colleagues for various reasons criticized the concept of biotechnology as the main discipline of teaching. However, the correctness of the decision to offer M Sc in biotechnology was exemplified by the number of good students opting for this course and also being benefited this programme. There are several sub-disciplines that evolved from the original general biotechnology to include the specializations such as marine biotechnology and agricultural biotechnology. Even today critics consider that modern life sciences and biotechnology are one and the same. This is wishful thinking at best and contrary to the scope of biotechnology, where science is linked to technology intricately.

In the early days, in the absence of industries, students primarily opted to pursue Ph D and other higher studies like advanced diploma courses in specialized subjects. Therefore, during the early days teaching focus was oriented towards research rather than training for technology and development. In the current scenario, there is adequate scope to remedy this situation. The undergraduate technologist development programme is a case in point. The finishing school concept also reflects this agenda.

The basic philosophy of imparting high-quality education with a focus on research indeed paid off well, since there are many leading investigators who are trained in

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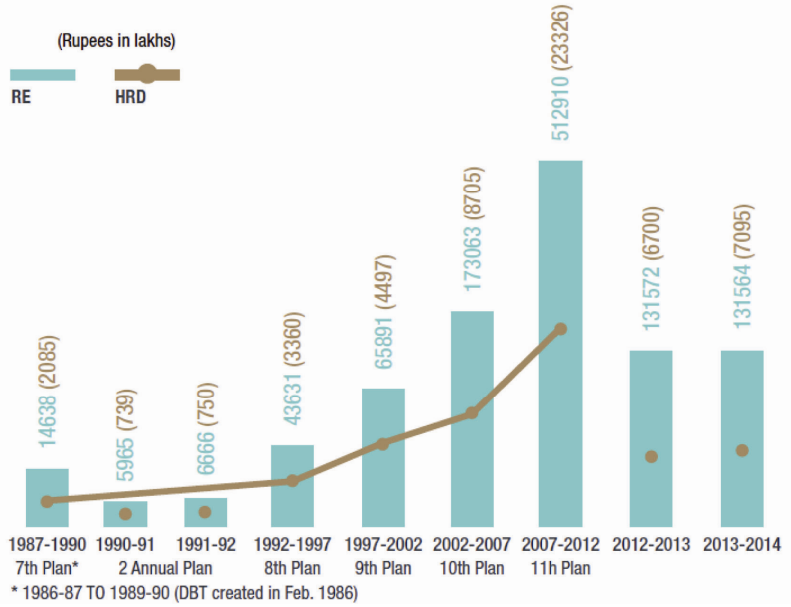

Figure 1. Plan-wise HRD expenditure vis-à-vis total expenditure in DBT. (Source: *Pursuit of Biotechnology – Opportunities and Options* (eds Govil, S. and Sharma, P.), DBT publication, 2015).

these courses occupying faculty positions in leading institutions. As the atmosphere has become conducive, the course structure needs to be drastically modified and new avenues have to be explored to train new technologies so that one will have a complete knowledge, including IPR to management to business economics. First, the curriculum itself needs to be oriented towards industrial environment. There must be enough capital sourcing for start-ups, especially if they are in the techno parks.

Biotechnology is a knowledge-led industry. Therefore, skills coupled with a mindset for creativity are needed. This is one of the reasons why there is a mismatch between teaching and industrial needs. Producing people with skill for routine repetitive activity and another group with skill as well as knowledge and creative thinking from the same batch makes the teaching job difficult. This can be solved if the programme allows the students at some stage to decide which stream to take up. This necessarily means the M Sc programme should be at least for three-year duration as in some other professional degrees.

DBT has initiated several programmes to address some of the issues raised above. The success depends on the vibrant industries who are not shy of spending some efforts on their own in collaboration with good teaching institutions to tailor the students for their needs. Many industries want people with every skill set they require, from technology to development to production and commercialization. It is not possible to impart all these in teaching institutions. A healthy collaboration is the only option; involving global players may be one solution. Interested industries from abroad may be co-opted with our institutions for the teaching programme.

Currently, more than 70 institutions and 150 companies are participating in some form or other in the human resource building exercise. What started as a small investment (Figure 1) of Rs 20 crores in the 7th Five-Year Plan period now receives ten-fold higher funding. What we now need is a clear mandate and guidelines for utilizing the experience acquired over the years to streamline the teaching programme and orient the teaching towards industrial needs and entrepreneurial development. We are good in imparting knowledge, but creating a work force with appropriate skill set for technology development and implementation is something that needs immediate attention.

Another area where biotechnology education can make a huge difference is the integration of computational biology with biotechnology. Especially with the omics research explosion, we need manpower in selected areas of data interpretation, particularly in genomics, proteomics and metabolomics. This is one area where start-ups in India could compete with the world market forces. Biotechnology knowledge plus computational skills could be the next-generation biotech entrepreneurship option.

Without good science there cannot be any meaningful application of science. Success of the human resource development depends entirely on the importance given to higher education in general and frontline scientific research in particular. In my view, this seems to be the most urgent need of the hour and all the stakeholders have to contribute to make this happen. Industrial development without innovative teaching that ignites creative thinking in young minds is unrealistic. The path to creating creators needs concerted efforts from several quarters.

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