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Biotechnology education in India: concerns and challenges

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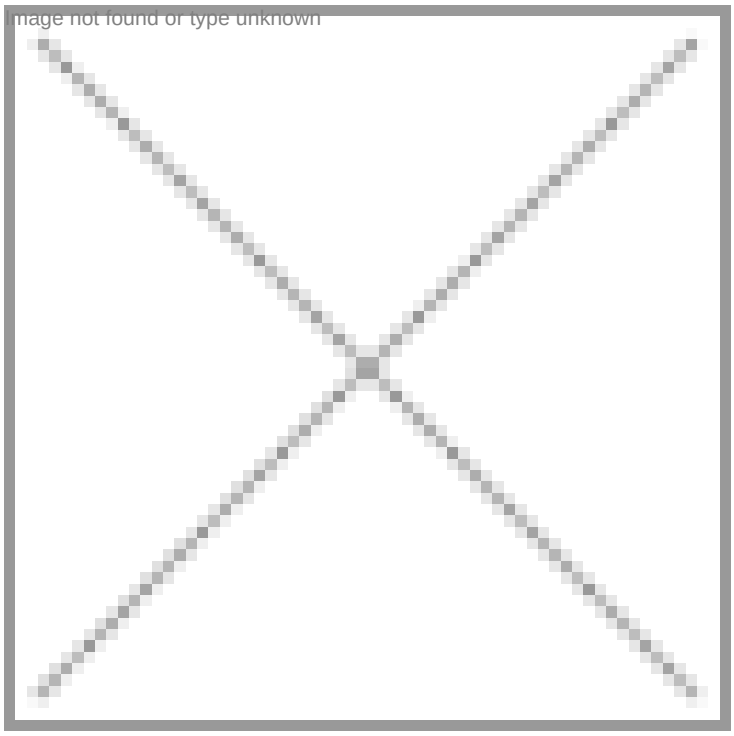

Biotechnology education in India: concerns and challenges

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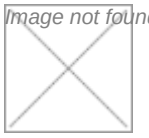

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Biotechnology has tremendous potential in improving human and animal health, increasing agricultural productivity and providing safe and clean environment. Realizing the urgent need to create high quality workforce, the department of biotechnology initiated an integrated program for human resource development comprising of post-graduate teaching, doctoral and post-doctoral fellowships, training of post-graduate students in industry as well as re-training of existing faculty and scientists in leading national and overseas laboratories.

The department took a conscious decision not to start undergraduate teaching in biotechnology as it is highly specialized and laboratory intensive course. It is difficult to attract faculty with relevant expertise in undergraduate colleges due to lack of research environment and proper laboratory facilities for hands-on training. It is difficult to provide fundamentals of basic science in specialized courses at undergraduate level and future career options available to students are also limited. The same sentiment has been recently echoed by Top-3 science academies of the country requesting HRD minister to wind-up all specialization courses currently offered at the school and undergraduate level. DBT initiated MSc courses in biotechnology in 1985 in six universities in consultation with other educational and research ministries. This was first such attempt in the

country which was greatly welcomed by academia and industry alike. These programs were conceived as collaborative, inter-departmental and inter-institutional programs and initiated on the basis of core strength of faculty, existing infrastructural facilities, R&D grants received on competitive funding basis, nearby institutions engaged in biotechnology R&D. Initiation of these teaching programs in biotechnology improved quality teaching in biotechnology as well as allied life science fields due to improvement of laboratory infrastructure and bringing in new expertise.

However, setting up of separate biotech departments subsequently by universities at times, alienated other participating departments. Perhaps, setting up of a school comprising of different departments could have been a better alternative. The department provided liberal grants for establishment of specialized laboratory infrastructure, recurring grants for consumables, studentship, books and journals, travelling, visiting faculty and contingency. Keeping in mind, the demand for trained manpower in specific areas and regional aspirations, these programs have been expanded in over 70 universities in general and specialized courses in biotechnology. Simultaneous uncontrolled expansion of courses by various private and public sector institutions without proper assessment of manpower requirement, available laboratory infrastructure, experienced faculty and sufficient consumable grant, has severely affected the quality of training imparted and damaged credibility of biotech courses in general.

Although there are no authentic estimates of the number of institutes conferring biotechnology education, there are varying reports. According to a report in The Hindu in 2004, 104 colleges (36 in Tamil Nadu alone) offer biotechnology at BE/BTech level. Survey conducted by IIM, Bangalore, in 2007 reports an output of 10,000 students per year at UG, PG and doctoral levels from 250 colleges with predicted annual growth rate of 20 percent. Education and Career Resource Guide brought out by BioSpectrum in 2009 lists 49 BTech courses, 108 PG (MSc/MTech/MPhil), 50 PG/PhD, 140 BPharm/MPharm courses. Geographical analysis of these institutes shows that Tamil Nadu tops the list with largest number of educational institutions offering biotech courses, followed by Karnataka , Maharashtra, Andhra Pradesh, UP, Delhi and Kerala.

Quality of students passing out of universities depends on a number of factors viz., selection of bright students with right aptitude, committed faculty with relevant expertise, upgradation of faculty, creation of laboratory infrastructure, updated curricula and enough hands-on training. Selection of students for DBT supported programs is made through common entrance test conducted by JNU at over 70 centers all over the country and only one out of 70 applicants is selected. Selection is based on multiple choice-based questions due to difficulties in evaluation of subjective question papers for logistic reasons. However, commercial interests of institutions running courses in self-financing mode leads to admission of second rated students. As against the number of students restricted to 10-15 per year in DBT supported programs, some of the universities admit as many as 150 students further affecting quality of practical training imparted. Some of the decisions to admit huge number of candidates appear to be guided by commercial reasons as these institutes charge substantial sums of money to the tune of Rs 1-2 lakh per annum.

In the DBT supported teaching programs, emphasis has been laid to appointment of 4-6 core faculty positions with relevant qualifications and expertise as well as provision for inviting visiting faculty in gap areas. Enough attention is also paid to upgradation of skills of faculty by organizing training in leading national and international laboratories. Appointment of contractual faculty with low remuneration without proper educational background and experience by universities running courses in self financing mode is a major constraint in conferring quality education. Some of these programs are run with skeletal faculty who cannot be spared for faculty improvement programs further affecting the quality of teaching.

The department of biotechnology ensures that model course curricula are developed periodically through a consultative process to maintain uniformity and to lay emphasis on practical training. New courses on intellectual property rights, regulatory issues, communication skills and recent developments have been introduced to address the concerns of industry. Some of the universities continue to teach outdated curricula due to lack of expertise and facilities.

The department is providing consumable grant and thesis grant on per student basis to ensure good practical training and has made it mandatory to conduct in-house project work. Some of the institutes conduct practicals in groups of 4-6 students and a large number of practicals are only demonstrated which severely affects their employability. Dr Lakhotia has addressed and condemned the decision of universities to compel students to take up project work in other institutes. This mandatory requirement of project work has led to mushrooming of private training institutes putting double financial burden on helpless students.

Opportunities for biotechnology students exist in agri-based industries, pharma industries, clinical research organizations, bioinformatics industry in R&D, production and manufacturing, quality control and analysis (QA/QC), technology transfer and management, knowledge-based marketing, consultancy organizations for preparation of techno-economic feasibility reports, regulatory affairs, patent attorneys and examiners.

The CEOs and HR executives of biotech companies interviewed by IIM, Bangalore revealed that employability of biotech students varies from 25-50 percent. IIM, Bangalore survey clearly brings out that intended supply of manpower is higher than the incremental demand for manpower per year. The problem is further aggravated by gap in demand and supply, employability of manpower and mismatch in availability of jobs and preference of students. Attention should be focused on quality education.

Although jobs for marketing are 20 times more in number as well as monetarily rewarding, biotech students opt for marketing as their last choice. An analysis of job preference by industrial trainees by Auroprobe Laboratories shows 58 students opted for R&D as first preference, 22 opted for quality control and analysis and only 14 opted for operations. All students opted for marketing as last choice. This does not augur well as there is a mismatch between job availability and

preference of students.

Analysis of first placement of MSc students passing out of DBT supported programs shows 50 percent students opt forhigher studies in India and 15 percent opt for PhD in overseas laboratories. Only 15-20 percent MSc students and 45-50 percent MTech students opt for jobs in industry. One possible reason for few students opting for jobs in industry could be low remuneration, non fulfillment of high expectations, routine jobs and stagnation in career graph. To attract students for taking up jobs in industry and to bridge the skill gaps, the department is providing industrial exposure to biotech postgraduate students for period of six months in industry.

Biotech sector is knowledge intensive and requires highly skilled manpower. There is an urgent need to attract bright students, provide quality training, retain talent, retrain existing people and reverse brain drain by providing re-entry packages to create and sustain a world-class human capital in biotechnology. Holistic education with judicious balance of basic fundamentals as well as latest developments need to be imparted. Undue rush to introduce biotechnology courses without proper infrastructure, expertise and research environment needs to be curbed. Efforts should be made to make education relevant to the needs of biotech industry. The industry should review remuneration packages offered to fresh entrants like the revision of fellowships by various government agencies.