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Revamp the biotech education: How to face the next 25 years?

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It is disheartening to understand that more students opt for foreign education as Indian PhDs are not viewed favourable, says Ram Ramanujam, Founder and CEO, Propinquity Sciences

What has led to the degradation of scientific temper in the country after CV Raman, the like of Saha and Bose and Vikram Sarabhai? Gary Pisano The great Harvard author of the book *Science Business* writes that he has never seen so brilliant people who are involved in the biotech business in the US. In India, highly skilled students work in IT and CS but marginal students choose biology and science careers. Engineering and medicine with IT as a focus remains a favourite to young students and parents whereas, in India, biology is still looked down on as botany and zoology although some good students enter the science track.

India is poor in the discovery and development of new drugs due to certain implicit reasons. Poor students enter the science track, a quality workforce is not available and students who are trained in the West are not returning to serve their country.

Pharma and biotech have to train their students after their BSc, MSc or the so-called BE biotech. It is disheartening to understand that more students opt for foreign education as Indian PhDs are not viewed favourably, even Premier institute PhDs end up doing long post-docs in the US and the EU.

How to set this right?

At an undergraduate level, we have to introduce students to hands-on training like that of the US. Students in their final year should be encouraged to do a project hands-on getting wet lab or dry lab experience. MS PhD programmes should have qualifier exams, wherein you should qualify for the master's or PhD programme, even if it is an integrated programme.

PhD degrees should be awarded after taking cumulative exams and passing a successful proposal defence along with an original research thesis defence. This model has proven to be working in the United States. Just research without exams and courses is preparing students with shallow knowledge.

In addition, finishing schools should not concentrate on just finding employment, but offer depth in the subject research experience. Short cuts are no answer to success in R&D in academia or industry. Industry jobs are much different these days expecting people to have translational sciences experience. Our students are hardly equipped with these novel modern techniques of passing out of BE Biotech colleges or MSc colleges.

Students can aspire for a PhD in US or West but in the US, the PhD degree in the top 25 universities is awarded after stringent adherence to excellence in education and original idea-based research. If you award thesis-based research PhD then the course contents and rigorous exam-based evaluations are missing and students are poorly qualified to meet industry expectations.

It has to be brought to the notice of students of the present day that India is emerging as a knowledge economy soon. So quick fixes in engineering services, IT or ITES are poor choices, and early choice, the early scientific enterprise is the best option. Also, it should be noted that our students who are studying in the US should be encouraged to return to industry jobs in India, but our industry needs discovery research for that to happen quickly. Although there are many examples of hiring our experts from foreign soils, the volumes of people staying abroad are much higher causing a brain drain in the country.

The ecosystem that is existing in the US is University-Industry and Industrial economic zones and funding agencies should be nurtured in India to incentivise students to enter the science track. We cannot have better medicines of tomorrow combatting pandemics if we do not have a qualified workforce in the sector of pharma and biotech.

Modern Biology is a cross-disciplinary subject, context-dependent, and very hard to master with the flows of biology, chemistry, physics, chemical physics, IT and computers. One needs to be trained for a very long time, to profess knowledge in these areas and qualify to become a principal investigator.

Indian industry as I have written before is in cross-section figuring out whether to enter discovery. I strictly don't understand the dilemma that is in the minds of pharma honchos in India, asking myself how long generics is going to offer them a choice of growth.

This very fact is that the US-educated PhDs are finding it hard to return to India. The trained and qualified PhDs in the West are finding it hard to find jobs in India in discovery, while Indian students are poorly equipped in advanced Multi-Omics or Omics-led discovery. Be it a small molecule or large molecule, biology is woven into these scientific tracks.

My sincere advice to career-seeking students in Biology is ‘Early promise’. If you are keen to enter science, India welcomes you. It is just a matter of time before our industry will feel the margin pressures setting in. Generics and start doing discovery. This is the only path that they can take, no shortcuts left out in innovation. If you don't innovate you perish.

As Dr Nirmalya Kumar and Dr Phanish Puranam, point out in their research many patents out of India are forward cited How many in biology are being forward cited, or even improve the citation quality to that rank three or four in the international arena after the US and China. Even countries like South Korea are advancing science education in phenomenal rates, investing monies in research.

India should invest immediately a sizeable amount of GDP percentage in science education and research. As President Barrack Obama puts it the US invests in research and development like no other without expecting fruits in 50 years. He said this in the keynote to national academies. India should emerge as a leader in biotechnology and science streams. Priority investing is keen to boost productivity in research. New drugs, and medicines for the poor at affordable costs.

Having said that, students can choose a science career for better prospects particularly, Multi-Omics and Multi-Scale Biology are taking shape in the US, India is well poised to catapult into the next 25 years by initiating training programmes and incentives to attract students in the science stream and industry plus academia.