

CORRESPONDENCE

Creation of excellence in science in India

The Colonial Rule established Universities in India to expose the elite to Western thoughts and to produce clerks and Civil Servants to run the administration well, without jeopardizing the interests of the Colonial Power. The science courses were later set up to train 'Assistants' to the British scientists who were heading the scientific departments and organizations in India. The Universities met these requirements quite well.

However, these Universities and those established later are Universities only in name. They are mainly degree-awarding authorities. Creation of new knowledge, the true objective of a University has never been theirs. Developing students' minds to observe, to reason, and to question would not be conducive for administering rules and obeying even unreasonable orders from above. Such a training was and is alright for the maintenance of law and order and a status-quo. But that is detrimental for developments in science. That needs abilities to reason, to question authority and to innovate.

The explosive increase in the number of Universities from 20 in 1947 to around 200 now was mainly because politicians and their constituencies felt that more universities would prepare more people for more jobs of the type mentioned above. However, such 'white collar' jobs could not increase ten fold. Hence the current problem of a large number of unemployed graduates in science and the humanities. The universities are being asked to become job-oriented. That cannot be the objective of a true university.

During a Convocation Address, C. V. Raman had said: 'Speaking as a teacher of 24 years' experience, I can assert, without fear of contradiction, that the quality of the Indian mind is equal to

the quality of any Teutonic, Nordic or Anglo-Saxon mind...'

A change in the set up of our universities is therefore necessary, for creation of excellence in science. We have the necessary human material of quality. The talent is among the youngsters. It is towards the end of the High School career and during the first two or three years in a university that a youngster is, or can be, motivated for a career in science and his or her abilities to observe reason, and question can be developed. Particular care has to be taken that these abilities are not blunted. It is only thereafter that these youngsters can take up post graduate studies and research work in science and a few evolve into producers of excellent, world-standard science.

A single university, a National Science University, as proposed by Mahajan and widely discussed in the country will not be adequate. It would produce a few potentially excellent scientists. Most probably all of them would migrate permanently to scientific institutions in the US. We must produce many more than the developed countries could absorb

India's special problem

In today's India three factors determine whether a talented youngster would opt for a career in science.

- (i) Teaching at the pre-college levels, which could have excited a love and ambition for good scientific work—the reward being only a name or fame.
- (ii) Financially attractive job opportunities for him or her after securing an M Sc and a Ph D degree in science.
- (iii) The possibility of migrating to the US after securing a Ph D in science.

In general, the science stream in India

beyond the 'ten plus two' level is not attractive. The talented youngsters opt for medicine or engineering. Parental pressure and the financial prospects are the reasons. Even the children of the 'accepted scientists' in the country do so. Only about 15% of the National Science Talent Scholarship holders opt for a post-graduate degree in science. A medical graduate (MD) or an engineering graduate (M Tech) earns rupees fifteen thousand to twenty thousand per month by the age of thirty. A Ph D in physics or chemistry at a corresponding age cannot hope to earn as much. Even a graduate in Business Management, age for age earns much more than a scientist.

India should take care of this second factor, if we want talented young men and women to take up a science career and work hard to produce excellence in science. The public should be concerned and be prepared to make the necessary financial contributions.

Along with taking care of these factors, mainly motivation and adequate remuneration, I would make the following suggestions regarding University Science Education.

Suggestions

It is suggested that the science departments of some, if not all, of the existing Universities be taken out of them, and organized as separate units and designated as science universities with the regional names intact. e.g. let them be designated as Bangalore Science University, Bombay Science University, Delhi Science University, Allahabad Science University and so on. The Dean of Science in each University be given the additional charge of being the Vice Chancellor of the cor-

responding science university. No new buildings or senate halls need be constructed. They can be shared.

However, the charter for each science university should be spelt out as has been recommended for the proposed NSU. Steps should be taken to increase the interaction between these science universities and the existing national or regional scientific institutions, through co-operative projects, and shared teaching loads. The State Government or the Central Government should provide for the incremental expenditure required for such increased interaction.

Steps should be taken not to starve

the science universities. Donations may be asked for and received from the State Governments, from the NRIs belonging to that region, from industrial concerns, from philanthropic citizens, from cinema stars and from past students of the region.

The sections of the charter dealing with the new type of management and on the lines suggested for the NSU should be implemented as soon as the new science universities are formed. The management will be on the basis of a horizontal structure instead of a vertical structure. The youngest scientist will have as significant a role as the older ones in the programmes of teaching, areas of priority,

nature of the projects, etc.

With courage to question, ambition to achieve, and endeavour needed to leap-frog foreign developments in science along with the revised set up in science universities, I believe, that we will be able to generate excellence in science. It is only from excellence in science that new technology can develop. Otherwise India will be subjected to external punches of economical and political nature.

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Raising science in India á la NSU: the hunting of the Snark

Just the place for a Snark! I have said it twice:

*That alone should encourage the crew
Just the place for a Snark! I have said it thrice:*

What I tell you three times is true.

I have borrowed freely from Lewis Carroll¹ in the hope that for the cause of science he will not object. The snark and its hunt by a motely crew led by a captain who

'... had only one notion for covering the ocean,

And that was to tingle his bell'

makes a good parallel to the National Science University (NSU) proposal². The proposal, liberally criticizing the Indian University research and education, has been described and summarized in good measures, by people outside the Universities, in a recent issue of *Current Science*²⁻⁶. The NSU paper makes repeated assertions and searches through the problem of science in India to find the solution it wants. One difference being, for the snark story, Lewis Carroll candidly prefaces his piece with a tongue-in-cheek defence against the charge of writing nonsense. That such a proposal should be considered seriously at the implementation level is an indication of the extent to which the scientific and political leadership is divorced from ground necessities and social consciousness. There exists what is called, by C. Wright Mills in a different context⁷,

'The Power Elite' in our scientific and political milieu. Therefore, it will not be surprising if the 'extraordinarily naive' (to quote P. Balaram³) NSU proposal is accepted. This will lead to the formation of a new National Science University with an outright government grant of Rs 200 crores. However, that will be a sad day for the needs, requirements and direction of science and also education in India. The flip side will, of course, be that the NSU will be located at or near a major international airport making it within the reach of the bright young aspiring Indian research student who routinely travels via the liberalized open skies!

Present status and the need for improvement

'We have sailed many weeks, we have sailed many days,

(Seven days to the week I allow)

But a Snark, on which we might lovingly gaze,

*We have never beheld till now!'*¹

There is no gainsaying the fact that there are serious deficiencies in the education and practice of science in India. The last couple of years have seen in news media and science journals, a renewed discussion of the ills and shortfalls afflicting the scientific community and the extent of our science and technology development⁸⁻¹⁰. Our relative ineffective contribution to scientific development¹¹, the drop in the

quantum of students opting for science¹², the stultifying effect of the growth of administrative and bureaucratic machinery in Universities and Central Agencies—these are only some of the indicators of our quagmish situation.

The NSU proposal does highlight, akin to the way of the jester Tenalirama in our folklore, our status and need in science education and research.

What is to be done

'Come listen, my men, while I tell you again

The five unmistakable marks

By which you may know, wheresoever you go,

*The warranted and genuine Snarks.'*¹

It is obviously not reasonable or meaningful to provide one line summary solutions to the ills of science and technology having an etiology related to the history, socio-economics and politics of our land. But the prime cause definitely lies in the manner, delivery and orientation of our education—not only that of science. Careful and in-depth analysis of our education system has been made and remedial measures have been suggested earlier¹³⁻¹⁵. Our education system suffers from the irrelevance and rigidity of our curriculum, the unscientific teaching methods that destroy the inquisitiveness of the students, the lack of proper basic educational facilities, the outmoded examination sys-