

eight desiderata for NSU governance to satisfy: (these are repeated verbatim by Srivastava in articulating his concept of NSU). As far as I can see, most of these desiderata are already in place in IITs. For over a quarter of a century, IITs have been with us as role-models. Why were't their structure and functioning transplanted to any of the central universities? Who should be blamed for this? The scientists? The UGC? The ministry? If any of these, how can this inherent problem be rectified?

Mahajan opts for a typical NRI solution. Make a special case of NSU. Bend the rules. Or, better yet, take NSU outside the existing laws of the land. After all we have created Export Promotion Zones; Technology Parks for NRI-use under special dispensation. Why not, then, a NSU for the benefit of NRIs who will have a reserved quota of 20% of the faculty positions to be held on a 'mobile basis'?

According to Mahajan, 'Indians living abroad will be approached for donations of equipment and facilities'. What kinds of equipment and facilities? Supercomputers? Nuclear reactors? Particle accelerators? Optical and radio telescopes? 'Nonresident Indians will be called upon, additionally, to make contributions of journals and books.' If this is being made as a serious proposition, Mahajan should make some rough estimates of what it takes to build a library facility to meet 'world-class' scientific research and teaching. One wonders what the annual budget of the library facility in the University of Texas, Austin, is!

On not being arrogant

Mahajan says: 'We must go out of our way in stressing that this proposal for NSU is not an arrogant non-resident solu-

tion for the ills of Indian science.' Nevertheless the text of his proposal is saturated with *implicit* arrogance. The mother of all arrogance is, of course, his tacit assumption that Indian scientists are incapable of figuring out, on their own, what ails Indian science and what corrective measures are needed. Before rushing in to 'change the turf', it pays to study and understand the nature of the existing turf.

Mahajan's contention that 'institutes devoted to basic sciences must become adjoined to universities or universities must be built around the institutes', has been a reality in India for several years now. Yet the science education problems at the university-level persist. The reasons for these are complex and deep-rooted. One must confront them and tackle them at many levels simultaneously. Running away from them by trying to establish NSU will not solve these endemic problems.

Mahajan urges that Indian science must 'create knowledge, translate it into products, and market and sell these products, lest we be continuously bullied by the Carla Hills of this World'. But what was worrying Carla Hill was not that Indian scientists were spending their time 'writing footnotes to the work of their Western counterparts' (as Mahajan dismissively characterizes what goes on in India). Her worry was that Indian science was beginning to establish its global credibility by designing and building supercomputers, successfully launching missiles and satellites, and making alarming inroads into the software market of USA. Hundreds of young scientists trained in Indian universities have been playing critical roles in these accomplishments.

Mahajan contends that Indian scientific institutes should provide 'convenient and ever open-channels' to enable NRIs 'to

repay some of their debts... to the country of their birth'. The operative terms here, one presumes, are 'convenient' and 'ever open'! Perhaps Mahajan does not know that NRI medical professionals have creatively solved this problem by establishing hospitals in India as purely business propositions depending only on the market mechanisms for financial support.

If NRI scientists want to establish privatized universities on a similar basis, there is nothing to prevent them from doing so thus creating 'convenient and ever open' avenues for repaying their debts to the country of their birth.

A concluding remark

NRI scientists' eagerness to establish NSU as a privatized university with Indian government's financial support is understandable. One can even sympathize with the emotional dilemma in which some of them find themselves. But what I find very puzzling is that an eminent educationist like Srivastava, who understands thoroughly *from the inside* the complexities of the Indian educational scene and its ailments, should have convinced himself that an elitist proposition like setting up a NSU (along the lines envisaged in Mahajan's proposal) catering to a handful of students and scientists is a solution, or even the beginning of a solution, to the ills plaguing our universities and the teaching of science in them. I find this not only puzzling but infinitely saddening.

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The National Science University—A holistic conceit?

The proposal for the National Science University (NSU) reads as an extraordinary conceit of holistic or Utopian social engineering. The talk is of 'revolutionary and massive programme of rehabilitation'^{1,2}. Only someone who has not read Popper³ could have designed such a concept.

Popper advocates a gradualistic, piece-

meal approach to designing institutions. He said, 'Only a minority of social institutions are consciously designed while the vast majority have just 'grown' as the undesigned results of human actions'. Thus, if Oxford and Cambridge, Harvard and MIT, and our own Indian Institute of Science grew to be enviable bastions

of excellence, it is because the Darwinian forces of natural selection that acted on the *unintended consequences of rational actions* of its constituents led it in that direction. And if most of our universities and research institutions have degenerated into cesspools of mediocrity, complacency and corruption, it is because similar Dar-

winian forces were not allowed to root out divisive and destructive tendencies as soon as they appeared.

Popper went on to formulate the hypotheses, 'You cannot construct fool-proof institutions, that is to say, institutions whose functioning does not very largely depend upon persons: institutions, at best, can reduce the uncertainty of the personal element, by assisting those who work for the aims for which the institutions are designed, and on whose personal initiative and knowledge success largely depends.'

In this light, it is easy to understand what has gone wrong with our institutions. Mahajan¹ and Srivastava² document this sorry state of affairs very well. Lord Acton's law of corruption: 'You cannot give a man power over other men without tempting him to misuse it—a temptation which roughly increases with the amount of power wielded, and which very few people are capable of resisting,' applies to our scientific establishment managed by a few extremely powerful people. A monolithic NSU, laid top-down, will continue to have a powerful establishment of vested interests. A tyranny of the *status quo* would set in quickly. It cannot be free from this law of corruption. What India needs very badly today are a few good men capable of resisting temptation.

The logical technological solution, adopting the piecemeal social engineering

approach advocated by Popper³ will therefore be: a) start with our impoverished and demoralized universities; b) reward with financial and moral support, every individual (or group) who demonstrates excellence, encourages scholarship and rewards merit and who puts the aims of the institution before his own selfish ends; c) bring in reforms slowly, make small adjustments and re-adjustments which can be continually improved upon, looking out always for the unavoidable consequences of any reform.

The 'Shah Jehan syndrome' of 'mindless construction of infrastructure (most often, brick and mortar) has now left us with more science mausoleums'⁴ precisely because we ignored, often by design and sometimes by oversight, the importance of supplying proper personnel to run the institutions.

With piecemeal engineering in place, we need not bemoan the lack of ambitions with teleological resonances such as 'the ability of scientists to work collectively and purposefully towards common goals'. The Popperian regime of a negative feedback mechanism of correcting all errors will allow us to nurse our institutions back to health by ensuring 'that each successive generation [is] better than the previous one'⁵.

Some of the piecemeal steps are already there in the Mahajan proposal: 'change the turf, change the rules and make doing

science rewarding; make the economic and social status of a scientist-teacher a bit higher than that of a soap-salesman; show that society values research, innovation, invention and discovery.' With proper will, all this can be done now, without waiting to start the NSU. Thus, Ramakrishnan's suggestion⁵ to 'make use of what exists, and improve on them organically' has singular merit from the Popperian point-of-view.

Given the gradualistic nature of the philosophy of *rational moderation* of Sir Karl Popper, it will take a long time to bring our institutions back to health. Therefore, there is no time to lose. Four hundred crores of rupees is a handsome sum of money with which to start. So start immediately!

1. Mahajan, S M., *Curr. Sci.*, 1994, **64**, 503–508.
2. Srivastava, P. N., *Curr. Sci.*, 1994, **67**, 508–512.
3. Popper, K., *The Poverty of Historicism*, Routledge and Kegan Paul, London, 1957.
4. Balaram, P., *Curr. Sci.*, 1994, **67**, 502–503.
5. Ramakrishnan, T. V., *Curr. Sci.*, 1994, **67**, 516–519.

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NSU: The Mahajan proposal

A large number of Indian scientists will appreciate the initiative taken by *Current Science* in opening the Mahajan proposal on the establishment of a National Science University (NSU) for a wide discussion. Since Independence Indian educationists have made a number of attempts to rectify the prevailing defects in the system of science education, suggesting remedial measures for improvement. Unfortunately, however, the problems before us seem to be so complex that no perceptible improvement has occurred. One wonders if the real cause of the awkward state of our educational system has been identified correctly. The NSU proposal offers an elaborate and ambitious programme to turn the tide and march towards a

glorious future in the years to come. It appears attractive in the extant milieu of economic reforms and encouragement of private enterprise in nation building. In view of the past experience of educationists who have witnessed failure of several apparently good ideas while being translated into action, one has to proceed cautiously so that the new proposal does not add one more to those that were ushered in with great zeal and eventually abandoned with despair.

Table 1 summarizes the important shortcomings in our science education as perceived by different expert committees appointed by the government and the UGC, along with their suggested causes and remedial steps taken in the past.

Most of the remedies have proved futile, largely because the diagnosis of the malady has generally been off the mark. So, in spite of the good intentions and investment of huge sums of money, the outcome has not been as desired. I must add, however, that each measure had shown the promise of success when introduced. It only tapered off with time.

I present here a list of some important causes leading to the present state of affairs. Many critics are likely to dismiss them as trivial, irrelevant or vague. I can only beg the charity of their attention until they have finished reading through. I firmly believe that in the prevailing cultural milieu of liberal thinking every possible opinion can be put forth if only