

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. Mahajan<sup>1</sup> and Srivastava<sup>2</sup> 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 Popper<sup>3</sup> 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'<sup>4</sup> 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'<sup>5</sup>.

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 suggestion<sup>5</sup> 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.

G. PRATHAP

National Aerospace Laboratories  
Bangalore 560 017, India

## 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



## CORRESPONDENCE

Table 1. Experiments in science education

Perceived shortcomings	Causes identified	Remedial measures
1. Uninspiring courses, no defined goals of science education	Policy of British colonial rulers to prepare natives for lower administrative posts	(i) Revision of syllabi to include national priorities, starting post-graduate teaching departments in affiliating-examining universities. (ii) Starting new universities
2. No quality research is done in teaching departments	Excessive work load of teachers	National laboratories; special research institutes; extra grants for research in universities.
3. Non-availability of teachers to undertake original research	(i) Poor monetary incentives and career prospects for faculty (ii) Lack of exposure to world standard research ambience	(i) Improved pay scales; creation of higher level posts  (ii) Attracting talented Indian scientists working abroad; offering pool officers' posts if regular vacancies did not exist on arrival. (iii) Exchange programmes with foreign universities
4. Adequate funds not available for quality research that demands expensive infrastructure	Large number of new universities to share available funds	(i) Selection of some university departments as Centres of Advanced Study and for special assistance (ii) Receiving foreign grants
5. General decline in standards of college science education	(i) Lack of growth in teachers' professional competence  (ii) No interaction of college teachers with university departments	(i) Staff colleges for in-service training of teachers; region-wise summer/winter programmes, etc. for acquiring academic excellence (ii) Teacher fellowships for acquiring higher qualifications
6. Talented students are not attracted to science courses	Prolonged science education delays acquiring employment (cf careers in commerce and administrative services)	(i) National Science Talent Search programme  (ii) Research associateships
7. Difficulty in meeting world standards	Inadequacies of school education	Programmes to improve school science; stretching the duration of formal education (10+2+3+2 years; +M Phil and then Ph D)
8. Inadequacies in learning and general competence	Faulty teaching and examinations	(i) Tutorials and preceptorials  (ii) 'Objective' type of examination; question banks; letter grading, semester instead of annual examinations
9. Difficulties in pursuing excellence in courses of study, innovative programmes and new fields of knowledge	Too many run-of-the-mill universities catering to students of average talent	Special universities; autonomous colleges
10. Lack of opportunity for pursuing frontier areas in which some Indian scholars have excelled	Rigid administrative norms for running universities	Separate research institutions for individual scientists
11. 'Incomplete' education lacking in cultural components	Tradition set by alien rulers	Sponsoring youth festivals, NCC; 'SPICMACAY', etc

to be rejected after a generous deliberation. I must state further that I am referring to generalities and not to the exceptions. I am painfully aware of the injustice I am doing to the devoted and meritorious teachers and administrators whose contributions are not amplified (in fact not even mentioned) in the following narration. No doubt, whatever is good in our science education today is owing to their missionary zeal. I apologise to them.

1. The most important cause of the present state of affairs is the lack of scholarly temperament among teachers. A teacher who does not update her/his knowledge and improve professional competence will not only fail to impart good education but also will inculcate wrong values that can make the students intellectual cripples. Many teachers encourage memorizing rather than understanding what is taught. They may justify doing

this in many ways, but the net result is that students lose interest in the subject. There are no regular seminars, discussions and journal clubs even in post-graduate departments where teaching is restricted to master's level courses. A good teacher ought to encourage students to think and pose questions that can be answered in the class room or dealt with during tutorials. The UGC wanted to sponsor introduction of tutorials as an important



component of teaching. Huge grants were once given and even separate buildings were erected for tutorials. Now the buildings are used for anything but the avowed purpose. Even when tutorials are shown in teachers' time-tables, they are not taken seriously, or at all. Very few teachers would like to have themselves and their courses evaluated by students. Their knowledge in their own areas of specialization is poor and naught in related subjects. Indeed, many of our professors are only playing professors; they are no professors in their real life. Whenever I enter the reading room of the central science library (DU) I find that those sitting there are mostly M Phil/Ph D students preparing for civil services or some such recruitment examinations. Not even ten per cent of the entrants to the library are teachers. This can be verified from the check-in registers. The library, as also the other educational infrastructures are underutilized. Given this situation, no improvement in the quality of science education can be expected.

2. We have somehow failed to develop a work culture in our educational institutions. There are many among the teaching faculty who have gone abroad and worked in eminent places of learning. Yet, when they are back home, they revert to the prevailing milieu of indifference. Administrators fail to maintain discipline among the employees. Most of them, including those provided with accommodation on the campus, turn up to work about half an hour late. There is now a convention that the muster rolls are open for 30 minutes after the 'official' checking time so that the employees can come in according to their convenience. Certainly,

no legislation or amendment to the constitution is needed to empower the administrators to take action against those who are not punctual. Evidently, the administrators are just not bothered about it. Or, are they afraid of trade unions controlled by recalcitrant employees?

3. Teaching programmes rarely, if ever, start on time. Admission formalities, choice and assignment of elective courses and such other trifling matters take several weeks. Examinations are not held in time and the results are not declared promptly.

4. Morbid trade unionism of teachers as well as non-teaching employees has ensured that all benefits of 'service' and much more is granted for no service *sensu stricto*. The impression one gets is that everyone is somehow out to exploit monetary benefits without a sense of remorse for not doing what is due in return. Automatic promotion to higher academic designations and the pernicious practice of re-employing all teachers for five years after superannuation has completed the process of degeneration of the university into an academic desert.

One can dwell further on the theme outlined above. However, the point has been made. So let us now pause to consider how to stem the rot. One thing is clear, at least to me: no foreign experts' advice or assistance is needed. Financial crunch is no doubt a handicap; but there are many ways of better utilization of the funds available. We can turn the tide only if our commitment to the task before us is genuine. The hypocrisy and dishonesty in our 'well prepared' plans and policy statements have to be noticed and highlighted. Both gloom and euphoria are pathological. Let us not pretend that

everything is in order in our universities. Let us also not think that we cannot do anything without help from outside. Those who paint a gloomy picture of Indian science education have only to watch how some special courses (e.g. biotechnology in the University of Poona) are run. They will be pleasantly surprised. We need not (and surely cannot) start reforms with a violent bang. The causes of degeneration narrated above are not imaginary; nor is their elimination merely a pipe dream. Improved salaries and perks is not enough to bring about the reforms that are urgently needed. There is no substitute for cultivating a scholarly attitude. There can be no compromise in matters of commitment and devotion to duty. Once the teaching community wakes up from its pathological slumber, everything will start improving, perhaps slowly, but no doubt, surely.

Finally, let us see the NSU proposal against the perspective portrayed above. We shall welcome the idea wholeheartedly only after showing that we are willing to put our own house in order. I greatly appreciate the sentiments of the NRI scientists who have come forward with a generous gesture for a noble cause. We shall have deserved their affection only after we have done what ought to be and can be done at our end. Let us therefore think not twice, but several times, before sinking Rs 200 crores into the proposed NSU.

K. VASUDEVA RAO

44 Anandavan  
A-6 Paschim Vihar  
New Delhi 110 063, India

## The National Science University

The ailments of the Universities have been very nicely pointed out (*Curr. Sci.*, 1994, 67, 503-508) and these are all known to us. But nowhere has any treatment been prescribed. The general suggestions like devotion to teaching, sincerity of teachers, choice of good teachers, etc. are so general that those cannot be solved under the present system, specially the University system in the

country. If devoted teachers were available there would have been no problem at all. But how to find them, how to recruit them under the present political pressure, caste system, altruism etc. and how to fire them when they do not measure up? Moreover, every teacher feels he is devoted and the best possible teacher, how do we rectify this attitude? The main source of trouble is due to the

fact that our selection system is wrong.

More and more Universities have been created in the country with the hope that they will not have the problems of the old ones. They remain better for sometime no doubt, but eventually they catch up with the old ones. This write-up is a beautiful analysis of the present day university system but there the matter ends.