

money and continued support of large funds.

The proposal for a National Science University is unique in many respects. It is utopian in concept and will be an oasis in the desert when established. It envisages a total faculty of 100–200 with a proportionate undergraduate population of 800–1500. In addition, it may have about 200–400 graduate (Ph D) students. Most of the faculty will naturally come from institutions such as TIFR, Indian Institute of Science, some universities, research institutions and IITs. This may weaken the existing institutions. It proposes to bring about 20% faculty from outside the country.

Adequate funding is most essential for an institution of this nature. Money is required not only for the costly modern equipment but it is also needed for their periodic updating or replacement. Obsolescence in scientific instruments and computers is getting faster each year. There may be doubts regarding appropriate financial support from the industry to an institution which is primarily meant for basic sciences when industry has hardly come forward even to support applied research. It will be disastrous if NSU comes under State funding at some future date.

NSU may take about 200–300 students each year after 10 + 2 stage on the basis of an all India selection. It is likely to attract a fair number of foreign and NRI students on payment of higher fees. The UGC is reported to be keen on tapping foreign students because of financial squeeze on the universities NSU will certainly provide the students solid foundations in basic sciences and may lead to excellent research in frontier areas which is one of its main objectives. But applied sciences, biotechnology, earth sciences and other fields of study and applied research needed for national

development programmes do not seem to find a place there.

A number of M Sc and Ph D students turned out by NSU will find positions in institutions such as TIFR, IISc and some universities. Many may like to go abroad for higher studies, research and other attractive careers. A few may stay in the NSU for research and teaching. But with the present dismal situations in the country it is doubtful whether institutions other than NSU could provide the same environment, facilities and prospects as students in NSU will get used to during their studies. Information technology, banking, financial services, consumer industries and engineering services are the most attractive and best paid professions in the country today and NSU graduates with basic sciences may not fit in these professions.

Mahajan does not talk about primary and secondary education levels in the country. He discusses the status of scientific research both in the universities and the government institutions. He talks about the many ills with 'feudal' system working to the detriment of everything in everyplace and 'coteries of science managers' who are 'never held accountable for their consistent over promise and under delivery'. However, Mahajan's proposal does not provide any solutions nor any hope for the future.

The objectives of education are primarily to build character and impart knowledge to enable each individual to fulfil his obligations to family and society, contribute to build the nation and improve 'quality of life'. The universities are expected to generate excellence in the literary, scientific, technological and professional fields. But in reality, primary and secondary education is in shambles. Our universities have multiplied and have become mostly 'inefficient degree-awarding machines' with scant concern

for vital societal obligations³.

The institutionalized science and technology is mediocre and there is neither excellence nor relevance to the needs of the country⁴. Balaram² says that whatever we have achieved in atomic energy, space and agriculture is 'adaptation and successful implementation of techniques already tested elsewhere'. There is a general perception that 'the ship of Indian science is floundering and rudderless'. We have failed in both the sectors—education and science—the two most important inputs for development of any society and country. NSU may just be a glimmer on the horizon. However, there are solutions^{3,4}. Hard decisions will have to be taken. Massive all-round developmental efforts through education, science and technology are needed to remove illiteracy and poverty, which in turn will help the nation to reform the existing institutions and establish many others to ensure healthy growth and excellence in every field. The country can march ahead with renewed dedication and vigour since—the talent, the infrastructure, the expertise and technologies—all that is needed for success is available. But when will the decision makers⁵ and the persons responsible for the implementation wake up to see the light?

1. Mahajan, S M., *Curr Sci.*, 1994, 67, 503–508.
2. Balaram, P., *Curr Sci.*, 1994, 67, 502–503.
3. Hari Narain, *Indian University System—Revitalization and Reform* (ed. Mathur, M. V., Arora, R. K₂ and Meena Sogani), Wiley Eastern Ltd., New Delhi, 1994, pp. 422–432.
4. Hari Narain, *Curr Sci.*, 1993, 65, 739–742.
5. Hari Narain, *Nature*, 1994, 371, 278.

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The proposal for a National Science University—some comments

One gathers from the October 10th 1994 issue of *Current Science* that a major new initiative aimed at providing high-quality science education from the undergraduate stage upwards is underway, with a massive investment of Rs. 200 crores from the Government being talked

about. While the proposal by Mahajan is by no means the first expression of concern for the existing situation or suggestion for action, it seems to be the first taken seriously in terms of Government support. One hears that many constraints which have shackled existing institutions

may be relaxed for the new one—hopefully the benefit will in time extend to the old ones as well! Given that such a substantial level of investment towards the specific goal of higher education in the sciences is being considered, the question of its optimal utilization is a natural

one and the articles in the same issue of *Current Science* by T. V. Ramakrishnan and D. Balasubramaniam do address it. This letter concerns some further points which seem important in this context.

The proposal itself seems largely a description of what the university should not be, launching as it does a violent attack on a straw man by describing the lower end of institutional culture in India. It seems worth emphasizing that many of the trends pointed out (e.g. the tendency for a dominant individual to be intolerant of different views and the rise of any threat to his authority) are really basic human nature and I have heard similar descriptions of very well known research establishments (e.g. in highly competitive and well-funded fields like plasma physics and molecular biology) in countries other than ours. Equally, if one chooses to look at the upper end of institutional culture in India, one might see a very different picture from the one that Mahajan paints. This is not just a matter of offended RI pride. The entire case for pumping all ones resources into starting from scratch rather than the more conservative approach of improving and helping existing institutions rests on this polemic device of dichotomy between the good guys and the bad guys. In reality, however, many positive trends are emerging in some institutions—greater consultation in decision making, more peer review in funding, a departure from the old pork barrel approach of starting projects or institutions based on personalities without adequate documentation and review, etc. One sees in the younger generation a healthy disrespect for things like medals, media exposure, awards, and ceremonies—one hopes that the mention of this kind of incentives in the proposal is an aberration! Inclusion of this sort of thing in the proposed NSU set up would be taking a giant step into the past, not the future.

One of the crucial assumptions behind the proposal is that a cornucopia of benefits in academic expertise and scientific equipment will descend on the NSU from NRIs. Mahajan cites conversations with people as the basis for this but I would urge some wariness on this score. First of all, the number of actual doers in any enterprise always turns out to be smaller than the number who initially promised help. Secondly, one must be realistic about how much time and effort

someone with a full time career in the US can afford to expend on something like the NSU. Let us take up again the fortunes of Yogesh ('call me Joe') Sarma, T. V. Ramakrishnan's apt creation. Since he pursues a high pressure career in a competitive environment where every xerox copy has to be paid for out of a grant, which is going to be given on the basis of publications, is it fair or reasonable to assume that he will use up hard-earned sabbatical time teaching teenagers in Delhi how to differentiate or programme a computer or align optical components? More likely that the hard and uninteresting but vital aspects of training young people will be left to the 80% resident faculty, with the 20% dropping in to deliver inspiration from time to time. More generally, teaching at the undergraduate level and research are uneasy companions even in the best places in the world and it would be naive to equate competence in these two areas in planning the NSU.

I consider the IIT experience very relevant to the NSU proposal. Many of the ingredients, viz. liberal funding, expertise from abroad, freedom to function differently, etc. were all present at the birth of the IITs. While some significant gains have resulted over the years, it is fair to say that there is no qualitative difference in the standards of the faculty, either in research or in teaching, between the IITs and the best of the universities. What is qualitatively different is the complete orientation of the bulk of the student community to the goal of going to the US, from the day of entry. This orientation could only become stronger if the very basis of the institution is an international advisory board and a stream of visiting staff, as proposed for the NSU. Perhaps, in the current mood of globalization and international competitiveness sweeping our country, this is no bad thing. But the same logic of the marketplace dictates that the Indian taxpayer does not have to pay for the enterprise! On this vital point of preventing the NSU becoming an export house, the best that the proposal offers us is ringing rhetoric—'Let us change the rules . . .' I can offer something marginally better, the first hand experience of one IIT student who did not emigrate. Quite simply, in my M Sc department, the most inspiring teacher, experimenter and theorist all rolled into

one was someone whose own Ph D was from within the country and he was proud of the institution from which he came. The place where I worked for my Ph D again had many people with the same characteristics. As Einstein once said, 'Example is not the best way of influencing people, it is the only way'. There is no xenophobia here, and in fact where one got one's Ph D is not the deciding factor. Some of the people mentioned above had spent significant periods abroad but their own commitment to working in the country was total and manifest—they were here by choice and not by necessity or as birds of passage.

To bring out what it takes to make a dent on the problem of science education, I would like to mention something which people sitting on Ph D entrance interview committees in physics started to notice a few years ago. The American College in Madurai seemed to be over-represented in the list of successful candidates, and the students coming from there were not afraid of basic electronics, computation and optics. Much of the credit for this was due to Richard Riesz, who built up the Physics Department there over twenty five years as a Resident non-Indian. I hasten to add that non-Indian refers strictly to the passport! Indian is as Indian does and while the NRI might be a convenient concept for some economic purposes, the phrase carries elements of internal contradiction for any other purpose. The obvious way to do something about some problem in India is to come here and fight. Put differently, the pilot of a passenger aircraft does not go around wearing a parachute on his back and would not inspire confidence if he did. The founders of the NSU will have to think very hard about the possibility of creating one more Government funded manpower export agency, which seems close to a certainty with the proposed structure.

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The views expressed in this letter are those of the author as an individual, not in his capacity as a member of the *Current Science* Editorial Board.

The October 10th issue of *Current Science* contains a proposal by S. M. Mahajan for a National Science University, together with the comments by P. Balaram, P. N. Srivastava, D. Balasubramanian and T. V. Ramakrishnan. In the same issue, reactions of readers to this proposal were also solicited. I write in response to the above.

Bringing up the second level

The Mahajan proposal has, as its starting point, the premise that we in India have failed miserably in establishing any kind of presence for Indian science on the world scene. As Ramakrishnan points out, this conclusion is by no means clear-cut. For instance (as pointed out by Ramakrishnan), only two scientists of Indian origin have been elected as Fellows of the National Academy of Sciences in the US, whereas five Indian scientists living and working in India have been elected as Foreign Fellows of the same academy.

But let us grant Mahajan's premise for the sake of argument. The remedy suggested in the NSU proposal is essentially to 'write off' the entire Indian scientific contingent, the University Grants Commission (UGC), and all allied bodies, and to start a brand-new venture completely outside the ambit of existing bodies and the existing scientific community. In my view, this is an entirely incorrect remedy to the perceived problem. The main difficulty in India is that, notwithstanding all our tall claims of having the second largest pool of scientific personnel, most of these persons are working under abject conditions that are not at all conducive to the production of good science. If one examines the US universities, for example, one can observe that the 'roll-off' in the quality of universities is very gradual. There are the A+ universities (MIT, Harvard, Berkeley, ...) followed by the A universities (Michigan, Wisconsin, Illinois, ...), then the A- universities, etc. The fall-off in quality is quite gradual, and there are perhaps 50 to 60 universities in which a good individual can find a satisfactory research career. In contrast, in India, the fall-off after the IISc and the IITs (I am speaking here about engineering; similar comments apply to science) is alarmingly steep. The RECs, which attract students who are just about as good as those at the IITs, have *terrible* facilities in contrast to the excellent facilities provided to the IITs. If the US

experiment tells us anything at all, it is that a nation cannot afford to place all of its eggs in a very small number of baskets. Thus I would recommend a *collegial* approach to science in our country, in which the disparities between institutions are not absurdly high, and the number of institutions with adequate facilities is further increased. In contrast, the NSU proposal takes exactly the opposite approach, by advocating a single 'super' university and reducing everything and everyone else to a second-class status.

NRI white knights

One of the striking features of the NSU proposal is its emphasis on the role of NRIs. For instance, while the proposal wants NSU to be free of quotas, it nevertheless envisages a 20% quota for NRI professors. The premise is that, having made a mess of the situation, we in India need to be rescued by a group of NRI knights riding in on their white horses, spending periods of up to two or three months a year.

I was an NRI myself for nearly twenty years before I decided to return to India about five years ago. During my stay abroad, I felt quite concerned about the quality of research and education in India, and wanted to do whatever I could to help. I even contemplated spending a few months every year in India (as is being envisaged in the NSU proposal). But after due deliberation, I came to the conclusion that, while 'spending a few months a year in India would have done wonders for me—I would have been able to keep abreast of various *grihapraveshams*, marriages, births, deaths, etc.—it would do little or nothing for India. *Ultimately the fate of Indian science and engineering will have to be decided by those who are committed to it full time.* That is why I decided to return. The five and a half years since my return have only reinforced this belief. Obviously we in India should tap into the world community and interact with the *best* that the world has to offer, be they NRIs or otherwise. But we should be wary of mediocrities trying to get free trips to India at someone else's expense. This leads to my next point.

Doing good research vs being well-known

It seems to me that many NRIs confuse

doing good research with being well-known. There are many good scientists in India who are little-known or appreciated outside the country, mostly due to a lack of exposure. Conversely, there are many 'well-known' scientists overseas (not just NRIs) whose scientific reputations are out of proportion to their actual accomplishments. Again, this is a matter of exposure. This is why many NRIs who contemplate returning to India are so worried about keeping one foot abroad—so that they can continue to maintain *exposure*. My own experiences since returning have convinced me that it is not all that difficult to continue to do good research in India. But one does have to make some sacrifices on the exposure front. If one is not prepared for that, then he should not return. *A natural corollary is that we in India should rightly be suspicious of those who wish to keep one foot outside India even after their return.*

Feudalism in India

The NSU proposal begins with a broad swipe at all directors in India and the feudalistic structure imposed on Indian science by these supposedly omnipotent beings. One is a little surprised to see such coffee-table gossip elevated to the status of proven fact. Besides that, if one is to believe the write-up of Balasubramanian, the proponents of NSU have already met the Union Ministers of MHRD and Finance, and are preparing to meet the Prime Minister. The rest of us mere mortals do not have access to such highly-placed politicians. Thus is it not ironic that, having attacked feudalism in the first place, the proponents of NSU now seem to be taking recourse to the very same feudalism in order to push their proposal through?

In my opinion, the perception of feudalism in India is based largely on the disparity between the number of *decent* jobs and the number of aspirants to such jobs. Of course, in any country, the number of *coveted* positions is going to be very small, and the competition for such jobs is going to be fierce. Based on my experiences of having been involved in faculty selection, promotion and tenure in MIT and Berkeley over a number of years, I can confidently state that the amount of favouritism and political

maneuvering in the USA for *coveted* jobs is not any less than what it is in India for comparable positions. But the important point is that in the USA, not getting a *coveted* job does not spell the end of one's research career (see above), while it does here in India. Not everyone who wishes to pursue a career in scientific research *expects* to become a Bhatnagar Laureate or a Fellow of the Academy of Sciences (They may *fantasize* about it, but that is a different matter). If we could substantially increase the number of *decent and satisfying* positions, I think much of the talk about feudalism will disappear.

One last comment

The NSU proposal envisages an initial commitment of Rs 200 crores by MHRD—an amount comparable to the *entire annual budget of the Department of Science and Technology*. An infusion of Rs 200 crores of fresh money into the *existing* university system will *do wonders* to raise the quality of science in India, especially if the strait-jacket quality of the regulations governing our scientific establishments are relaxed at the same time. It is by no means obvious that NSU will make better use of this money than existing institutions.

Conclusion

The above comments make it clear that in my view the NSU proposal is rather naive in its perceptions, and if implemented, will actually *exacerbate* the problems that it purports to solve. Underground gossip has it that the Mahajan proposal is already a *fait accompli*, and that there is no chance of anyone doing anything to stop the NSU from becoming a reality. If that is indeed the case, then so be it. But if not, I think concerned academics in the country have an *obligation* to express their views on the proposal. Perhaps the political establishment is well-meaning in giving this self-serving proposal such a serious hearing. Let us give them that benefit of doubt. Proceeding on that assumption, let us inform our political masters that there are several excellent studies on how to improve the existing university system, undertaken by persons whose credentials and commitment to the country are beyond question

(e.g., the Bhide Committee report on behalf of the Planning Commission). But we would all be remiss if we simply stood by and permitted NSU to come into existence without serious debate.

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I shudder to think what the outcome of such a proposal would be, i.e. creation of National Science University which appears to have made an impression in the minds of 'pundits' of Indian science. When funding for science by the Government is declining in every established organization in the country, then setting aside Rs 200 crores for such a purpose only tells that Government has money for science indeed and Indian science and scientists have lost all their credibility in the eyes of the bureaucrats and ministers. As a result, they are now looking towards NRIs for SOS response to raise our standard to the zenith by pumping work-ethics, intellects, management in our system!

However, it is too naive to put all the blame on the Government and its functionaries. If today, Government is seriously considering Mahajan's proposal, it is because some scientists campaigned in favour of it. These are the people who were maximally benefitted from the state control of science in India over the last several decades. With the change in scenario, Manmohan economics, etc., now it is time for privatization of education with the blessing of the Government in the form of 200 crores!

We are all aware of the problems of Indian science. It will do a great service to us if today some Governmental agencies with the help of Rs 200 crore or more assure every college laboratory, every university department of constant voltage power supply, adequate water, uninterrupted examination schedule, and monthly payment of salaries with appropriate dearness allowances. Why does not some patriotic NRI adopt a college in his/her home state and see it functioning with ease?

The most difficult task in practising good science anywhere within or outside

India is to ask a good question, design and carry out a good experiment. Lack of ideas, competitiveness always drive failing scientists to look for alternatives. Building institutes and universities are easy options. Are we honest to ourselves if we say all the facilities that we have in the country today are inadequate for doing first-rate research?

However, the scenario is entirely different when one considers the poor undergraduate training level in India and at least in this respect Mahajan's proposal scores a point. On the other hand, no purpose will be served if such elitist training is concentrated in one or two places. The existing infrastructure should be toned-up, however bad they may be to start with. If millions are well-trained, five may turn out excellent in the long run.

To quote from Jim Wang (Harvard), the first three important ingredients of a good research activity are people, people and people. When National Science University is established in the vicinity of Delhi or some other place, where will the ingredients come from. Within 100 km of the centre of any city today, the literacy rate still hovers around 40% and alarmingly decreasing! Granting the expectation that NSU would create another Raman in 50 years time, would it also reflect the state of Indian research 50 years from now?

All our scientific achievements of the past are the product of individual genius. So the question of sustenance of standards over a period of time does not arise. When Raman was crying at Sweden sitting under a British flag, somewhere in India, people were sacrificing animals for rain, wealth, sons etc.

It has already been pointed out that the fat of Indian science should be pruned mercilessly. Let it be so. In addition let the government sources, private organizations and NRIs pull up their resources and see to it that every college at the district level at least runs 3 hours of laboratory, 4 hours of theory classes for 180 days in a year and that teachers are paid. The result is anybody's guess

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The October 10, 1994 issue of *Current Science* devotes a special section to the ongoing efforts to start the National Science University (NSU), an idea strongly advocated by Swadesh M. Mahajan and actively pursued by P. N. Srivastava through the corridors of power in India. A critique by D. Balasubramanian cautions that the rational modifications in the rules and regulations for the NSU, the freedom from the quota system, etc. are also to be thought of for the existing newer Central Universities, at least. T. V. Ramakrishnan sketches the existing scenario for higher education in Science in India, offers solutions for improvement and views the NSU as just an alternative which deserves further discussion by the concerned educators. In addition to the points raised in the critique and the solutions offered by D. Balasubramanian and T. V. Ramakrishnan, the following points may be worth debating:

The only Indian science institutions which find a mention in the aforesaid articles are the TIFR and the IISc. Recognition of any kind has also been consistently going in the past few decades to only those who are in these prestigious institutions or who had earlier association with them. There are other institutions which have also been in existence for quite some time now, such as the Indian Institute for the Cultivation of Science, the Bhabha Atomic Research Center, the Saha Institute of Nuclear Physics, the Institute of Mathematical Sciences, the Physical Research Laboratory and the Institute of Physics. A considerable amount of infrastructure, as well as talent is available in these Institutes. Perhaps the achievements of these institutes are no less than those of TIFR and IISc. If in the perception of the educationists, this is not true, then it is high time that we start asking ourselves the questions as to what ails these reasonably well-equipped and well-funded institutions, as well as the several Advanced Centres created within the Universities, from achieving the standards, at least, of the TIFR and the IISc. If we are convinced that the Mahajan proposal contains several aspects which would contribute to the creation of excellence in science education in this country, then these institutions, besides the IITs, are the places where these novel ideas may be implemented straight away, before the commencement of yet another new venture like the NSU. The experience

gained in the implementation of these ideas in these institutions would be very useful for the NSU by the time it starts functioning.

The scientific teaching profession should encourage the talented and deserving. Good teachers who enthuse the students are an asset to the country. The harm done to generations of students by a bad teacher is incalculable. Our Universities have been made to pursue the reservation system for appointments and there are States where teachers have gone to Court over the issue of a roster system even if there is just one post in a department! The educationists should be bold enough to ask the politicians not to continue with the wrong policies of going on increasing the reserved quotas. Merit and merit alone should be the criterion for research and teaching positions, and for appointments to the coveted Vice Chancellor/Director positions, if we want to make a mark in the international scientific scene. However, most unfortunately, those with clout are the only ones who seem to be getting into these sensitive positions. It does not require much effort to see how the policies followed by the educationists since Independence have brought the reputations of some of the renowned Universities of yester years to their present status. But who will dare to even voice such views and who can bring about such rational changes? The day such voices of sanity are paid attention to will herald a beginning for an upward trend in the standards of our Universities.

It has been aptly pointed out that most of the funding to the Universities (as much as 90%) goes towards administration and salaries. At least select University departments, which have shown promise of good teaching and research must be encouraged with more funds, after they adhere to the path of merit. Individuals who have achieved significant international recognition for research work done in our country should be given adequate funds, at the peak of their careers, to start autonomous Institutes (like the Max Planck Institutes of Germany), within the framework of the Universities themselves. The science bureaucrats who have administered science and manipulated people have been far too often rewarded in the past even with institutes after their retirement from administrative posts, though they had no reputation as scientists

in the international scene (since they had returned to India after a few years abroad after their Doctorates).

One should also ask the question as to whether all the NRIs are in the top institutions in those countries? After all, the 200 universities in the US are not all of the same standard! Who besides S. M. Mahajan are behind this effort to spend their time, energy, effort and money for the setting up of the NSU in India and what are their achievements in science in their chosen countries?

The NRI movement to start a NSU should be encouraged cautiously keeping in view these questions and the past experiences the country has had. The tendency to treat the NRIs as unwanted aliens has been felt by some and there have been coteries in this country who wanted to prove the NRI participation as a failure in the past. The Mahajan concept is in principle welcome but its implementation will bring in its wake enormous problems, some of which have been voiced by T. V. Ramakrishnan, in his perceptive article.

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In the issue of *Current Science* dated 10 October 1994 I read with great interest the proposal to establish a National Science University partly with Government funding and partly with investment by NRI. The comments by various scientists on this proposal, which also appeared in the same issue, were thought provoking. I do not wish to summarize the proposal again.

The preamble to the document makes a sweeping statement that scientists working in India, with the exception of a few working in some exalted institutions in the country, have not acquitted themselves creditably. The document also appears to imply that Indian scientists who migrated abroad have done much better than the scientists who stayed behind. I fully endorse T. V. Ramakrishnan's view that, at least in basic research, the above statement is fallacious. In the proposal for a new science university, it is proposed that each faculty member will be allotted \$ 50,000 per annum for his own research.

I can only point out that, even in the institutes of proven excellence in this country, a scientist is not assured of a fifth of this amount unless he is fortunate enough to get funding for a sponsored project. To me it is a wonder that, under the very adverse conditions for research prevailing in this country, our scientists have achieved so much.

In my opinion the reasons for the exponential decline in the quality of science graduates in universities are the following, in order of importance:

(1) Admission of students and selection of staff is made on basis other than merit. This pernicious practice appears to be spreading fast. A popular misconception is that meritocracy and social justice are incompatible. I strongly believe that the larger interests of social justice can only be served by recognizing and constantly encouraging merit.

(2) Experimental science, especially physical science, is in doldrums because undergraduate and graduate laboratories have antiquated equipment and the experiments are unimaginative and uninteresting. At the research level equipment have become costly and sophisticated requiring a level of expertise for their maintenance which does not exist in many universities.

(3) The cost of book and journals has risen steeply. This has resulted in the slow erosion of good libraries even in reasonably funded (by Indian standards) universities.

(4) Bureaucracy and red tape have gained a stranglehold on higher education. This is especially pernicious in the case of science and technology.

(5) Our universities have become too cumbersome with a number of arts and science departments/colleges under the control of each university. It is my submission that having universities exclusively for science and technology will prove beneficial for higher education in science. There are a few such universities in India which have certainly done better than the conventional omnibus universities.

The present proposal recognizes and explicitly spells out these points.

From the fact that the Government of India is giving serious consideration to the new proposal, it is apparent that it is aware of the above reasons for the decline in the quality of higher education and it is willing to consider insulating

selectively, the new university from these adverse causes. My question is, why cannot the Government extend the same benefit at least to those universities which have built reasonably good research departments? I think it will benefit the country more if the following steps are taken:

(1) Identify about six to ten universities in which good scientific research is being done and start strong undergraduate and graduate programmes in science.

(2) Recruit faculty and admit students only on the basis of merit.

(3) Design the curriculum in such a way that it will be possible for the student to choose a combination of electives without putting him in a straitjacket of worn out disciplines.

(4) Provide finances to improve undergraduate and graduate laboratory curriculum and funds for research equipment necessary for day to day use. Very costly facilities can be set up in special centres where expertise for their maintenance exists or can be developed and scientists can be provided funds for travel to make use of these facilities. Funds should be made available for the improvement of libraries in these institutions. The two hundred crores that is spelt out as one time government grant for the proposed university will be sufficient to augment the infrastructural facilities in at least half a dozen universities where a sound research base exists. For the same investment one can hope to get larger returns.

(5) Make a resolute effort to cut bureaucratic flab in these places and make the bureaucracy realize that its role will be supportive and subordinate to the academic functions of these organizations.

The above suggestions are nothing new. They have been made in greater detail in the report of the working group on undergraduate science education, set up by the Planning Commission in 1989 under the chairmanship of V. G. Bhide. This report takes into account the existing ground realities and has made comprehensive suggestions for a three tier programme which will be of greater benefit to the country as a whole than the new proposal for establishing a single privileged university at great cost.

There should be a discussion among a large number of scientists on the new proposal *vis-a-vis* the suggestions of the working group under the chairmanship

of Bhide and the Government should take note of the divergent views before it takes a final decision on the proposal of Mahajan.

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When I read the proposal, it sounded to me as if the foundation stone was being laid for another Empire, this time by NRIs, with active co-operation from spent-out Indian scientists. It was interesting to note that the foundation stone was to be laid, not in a location where peace would prevail and scientists could work with least distractions, but close to an airport so that for an evening discussion the scientist can fly (if flights would take off or land as per schedule) to near by Bombay or Bangalore or for a weekend discussion (if discussion would be possible in week-ends) even to London or to New York.

I think it was at the inauguration of the National Chemical Laboratory, Pune, that C. V. Raman expressed his dismay that instead of strengthening Universities, the government was building institutions which are unlikely to deliver the goods. But then Bhatnagar was close to Delhi, and having nothing more to do in his subject, wanted to build an empire for himself.

Next was the formation of the IITs. Some times I wonder whether there are deals among spent-out scientists, building contractors and foreign manufacturers, that proposals for infrastructures, in the nature of buildings and equipments (the latter quite often the being-phased-out ones) are rapidly accepted without giving any consideration for the long term utility of these institutions. The result of this is, for example, with the IITs, all that we have achieved is exportable-quality student-products, who later become NRIs, and of course, repatriate valuable foreign exchange.

Then came the Central Universities, the JNUs. The ordinary universities were no good and it was believed that addition of a prefix would have a salutary effect on the functioning of the Universities,

although many of the staff employed by these Universities would be migrants from the ordinary Universities/IITs/CSIR Laboratories. It was the nomenclature that mattered. It was sad that at this critical juncture, the UGC's destiny was in the hands of Chairmen, who did not assert the role Universities in science-building activities, who did not take up steps to improve the quality of teaching or research in the Universities.

I question the wisdom of starting a National Science University in which Government is expected to sink 200 to 400 crores, and NRIs and the burnt-out Indian scientists are going to reap the benefit. What are the 1000–2000 students going to do after they come out of these institutions? Most of them will go out of the country to seek greener pasture, and come back after 10–15 years, with another proposal, now for an International Science University. Others may end-up in the worthless Universities, IITs, CSIR laboratories and in the R & D laboratories of industries, which are there only to bring tax-benefits to the industries.

It is time that practising scientists wake up to the tom-foolery practised by spent-out scientists, who manage to keep close to Government. It is time that scientists, who have failed to deliver the goods even after being close to the Government, retire in good grace and give place to others to manage the scientific affairs of the Nation.

I am convinced that the destiny of science in India is only in the Universities. In my opinion the need of the hour is not starting one more University/Institution, but to support, with massive funding, those *individual departments* in different Universities where good teaching/research is being done. It is snobbery to state that no good teaching/research is being done in our country. Many of the scientists abroad, with whom students from my department (Organic Chemistry) have worked on Ph D or post Ph D assignments, have praise for the training they had received in India. Our students were found wanting, according to them, only in the handling of instruments, such as the NMR. The research in my Department is also good. The number of such Departments is not small.

Let us identify individuals in different universities/institutions, who have shown devotion to their work, without clamouring for positions, and displayed modernity

in their work. Let us provide them the facilities they need for their work. Science in this country will then grow in its stature.

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Several aspects of Indian science, its quality, the need to improve higher education, particularly in respect of science and the possible ways in which that can be achieved are being discussed for the last few years in our country. In the light of this background, the proposals about the National Science University (*Curr. Sci.*, October 10, 1994) are at the best uninspiring if not boring. Every one knows what is wrong, with our Universities. Every one knows what is wrong with our science. Every one also knows the steps that need to be taken to improve the situation. The only problem seems to be that each one is looking at the other or towards the sky for the implementation.

There are however, a couple of aspects I would like to highlight and emphasize my opinion *vis-à-vis* the proposal to start a National Science University which could function as a model for improving the standards of Indian science. While it is most welcome to run the University system on the lines proposed by Mahajan, I do not think there is any real necessity to create a National Science University in the manner envisaged by him and his supporters for improving Indian science.

There is no need for any host Government to throw hundred crores of rupees towards providing infrastructure for the model University and then close its eyes expecting miracles to happen from such an institution. On the other hand, the Government itself could identify a few places already existing in the country and which are doing reasonably well, in order to provide additional inputs and to confer administrative and academic flexibility that is envisaged in the National Science University. Indeed, there are some places in India where many of the ideal qualities attributed to the proposed National Science University, are already in vogue. For example, the University of Hyderabad has already incorporated many of these

qualities into its administrative and academic structure. What is simply needed is to allow a little bit more of flexibility in its recruitment and promotional policies and it would become a model University. If few more such institutions are identified and necessary inputs and the autonomy are given, I see no reason why excellence in science cannot be attained in these places.

The NRIs who are so keen to help their country of origin can certainly contribute their mite in more than one way in making these few institutions reach international standards. In this connection, it is pertinent to recall a recent news item in *Nature* (1994, 371, 188) where it is reported that the Ministry of Education in Japan is planning to spend the equivalent of 30 million US dollars to stimulate the development of centers of excellence in some Universities. It would be wonderful if the UGC initiates similar steps in our country.

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Let me first congratulate *Current Science* for exposing its readers to the proposal for establishing a National Science University. When one comes across such news, the normal response is either to take it casually or to ignore it. However, the debate which has already been initiated by you has seen to it that this does not happen.

The maladies afflicting the Indian Universities have been analysed by many. The proponents of NSU hope that the new institution will overcome all these, through a different organizational structure. They admit that there are two institutions devoted to science, which are functioning exceptionally well—the IISc and the TIFR. According to them, the drawback with both is that they do not provide undergraduate education.

The NSU, its promoters hope, will not be an export-oriented unit. It is rather difficult to accept this position. Let us presume that NSU will produce excellent scientists because of the special status it would enjoy. Considering the fact that our country is not in a position to offer

challenging and attractive employment to a majority of graduates from IISc and IITs, where is the guarantee that a better crop of scientists passing out of NSU would get attracted to the available opportunities in India? In such a scenario the NSU will become a venture of the NRIs by the NRIs for the would be NRIs.

The NSU 'must be accorded a certain special status... independent charter

without quotas and without binding and suffocating rules'. Why this special status to NSU alone? Finally, the NSU requires Government funding to the tune of 200 crores, for infrastructure. Should the country invest again on 'brick and mortar'? Why not initiate the experiment at a well established institution? The IISc with its deemed university status, non-affiliating character, less emphasis on

'quotas' will fit in to most of the description. What perhaps is required is a minor surgery of 'defeudalization' and grafting of undergraduate courses.

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