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CORRESPONDENCE

The proposal for a National Science University—More comments

The proposal made by S. M. Mahajan[1] for launching the National Science University in India is, indeed, laudable. The opinions aired by several people are interesting and equally valid.

Essentially, the political climate has damaged the whole system and it is further ruining, particularly, the education field. The reasons are well known. In such a situation, is establishing NSU really a corrective measure? Considering the statistics of people who have gone abroad to pursue higher studies over the past four decades, how many of them have made a mark in their respective fields, leaving aside a few exceptions. The only appreciable fact is that people did do hard work because of the fairly conducive environment and work ethics and, in fact, it has been a question of survival in the hire-and-fire policy in USA. Further, I may ask how many of them have got Nobel prizes or at least FRSs? The data are there for every one to analyse. In my opinion, majority of the people who did leave the shores of our country aspired only for comfortable living and working conditions. Of course, I find nothing wrong in it as the blame lies squarely with the 'political masters'.

Mahajan's proposal does not appear to be a solution. The political interference, British hierarchy, bossism, corruption, etc., must end but to realize this there is a long way to go. Certainly, a part of the blame should go to the intellectuals of this country. People at the helm of affairs always did voice their displeasure for not funding their own personal research projects but could not try to enthuse the young and talented in this country. I may add here that the primary- and secondary-level education system in our country needs thorough modification in every aspect, as it would give a strong base for the advancement of human mind. We are overburdening the children with unwanted information where there is least scope for creative thinking and mental relaxation.

Hence I propose a few alternatives. Mahajan and other NRI friends may pool the fund and a trust may be formed. The accumulated interest amount may be distributed as scholarships to brilliant young men and women, without any bias towards any caste, creed, community, etc., for pursuing higher studies. This would particularly be helpful for youngsters who come from poor families. By spotting out the talent, the governing body of the Trust may itself secure admission in a suitable institute anywhere in the developed world. Further, the governing body may identify with the help of industry the areas of scientific research projects relevant to our country and recruit young people who completed their higher studies with the financial support of the Trust. That would automatically facilitate their working in our country.

Further, I may suggest the following for improving the quality of scientific research in the existing universities:

1. Teaching appointments may be made on contract basis, say for 3–5 years up to the level of Reader or Associate Professor in all the universities, as it may create a system of accountability from the teaching community. Also, it would facilitate free mobility of the teachers from one institute to another.
2. No teacher should accept more than three students for supervising Ph D, that too without fellowship.
3. Research funding agencies should straightaway send the sanctioned amount to the Principal Investigator so that it would help speedy implementation of the research project and at the same time the investigator may be made accountable in every aspect.
4. We should introduce the feedback system from students to assess the quality of teaching, i.e. the capability of the teacher.
5. For free mobility of the students from one institute to another, we should introduce the credit system so that, depending upon their interest and demand for employment potential, they may shape their career on their own.

In fact, it is the responsibility of every one of us to see that the existing learning institutes work more effectively, harmoniously and with a fair amount of equitable justice.

The intense urge, hard work, discipline and, above all, self-sacrifice are some of the basic qualities that would make a man reach higher intellectual levels and for that matter in any field of intellectual pursuit. In this modern age, collective effort and team spirit are necessary as the multidisciplinary approach has become the order of the day, particularly in sciences.

Taittireeyopanishat[2] says '... *Athadhi vidyam Acharyah poorvaroopam antevasyuttararoopam vidya sandhihi pravachanagum sandhanam ityadhi vidyam*', that is, knowledge grows only out of a churning process of intellectual minds and it is possible only through constant contemplation of the teacher and the taught together (my crude translation). I believe that the above-said concept is valid even today and, in fact, it is the need of the hour. After all, it is the human being that matters and not the

Institute in the form of materials for the advancement of the intellectual mind. I am sure Mahajan and his friends in USA would give serious thought before they embark on such lofty ideals of making India rich in the advancement of science.

1. Mahajan, S. M., *Curr. Sci.*, 1994, **64**, 503–508.
2. *Taittireeyopanishat* (Sanskrit–Telugu version), 1986, Sri Ramakrishna Mutt, Madras.

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Starting with Ramakrishnan's[1] excellent critique of the proposal for an NSU, enough letters have appeared in these columns to show that our community is well aware of how silly, self-serving and pernicious this proposal is. Is it really possible that with so much opposition, based on the most rational grounds, this proposal can actually be pushed through? Are we really that weak? Or is it that, as usual, we are collectively afraid to rock the boat for fear of losing the scraps that are normally thrown to us? I believe that if we really wished to, we could stop this absurd scheme, no matter which stage it is at.

There are two points that I would like to make regarding the correspondence that has appeared on this matter so far. First, most correspondents have diplomatically avoided the issue of the feudal structure of our scientific establishment; the two who have not have implicitly supported the status quo have either pointed out that it is a consequence of 'basic human nature[2]' or that its existence is just 'coffee-table gossip elevated to the status of proven fact[3]'. I beg to disagree. I have seen enough evidence, and I am sure most of us have, to show that Mahajan is quite right in asserting (i) that Indian science is controlled by a small number of generally competent scientists who control the money, jobs, important committees and policy, who are obsessed with the setting up of 'infrastructure' rather than developing a strong scientific community, which is the real source of good science, and who run their empires with their far less competent students and flunkeys, (ii) that in this set-up there is no place for free thinking, independent, competent individuals, and (iii) that in the long run this cannot help but lead to a lustreless feudal set-up where there is little chance that great discoveries will be made. Can anything be done? As far as I can see, the only way out for the community is for enough individuals to refuse to cooperate with this power structure, willingly paying the price that will be exacted. Hopefully, in time a sufficient number of pockets of democratic, scholarly individuals dedicated to the development and promotion of good science will come into existence to provide a haven in the surrounding sea of mediocrity.

Which brings me to my second point. Most of us who have actually dealt with school children would have noted that children who are bubbling with ideas and enthusiasm in the lower stages of schooling gradually become duller, less questioning and more conformist as they progress through school and college. In a sense the damage has already been done by the time they enter university. For this and other equally important reasons, I believe that the priority given to 'higher education' rather than primary and secondary schooling was a serious mistake. Quite apart from considerations of social justice, general literacy and universal and top-class schooling are a necessary condition for the existence of good universities, which as so many have pointed out are the source of good science. Although it is less glamourous and vastly more difficult, we would, in my opinion, have to go back and strengthen and vastly improve and extend the school system if we are really serious about providing conditions in which science will thrive in our country.

1. Ramakrishnan, T. V., *Curr. Sci.*, 1994, **67**, 516–519.
2. Nityananda, R., *Curr Sci.*, 1994, **67**, 767–768.
3. Vidyasagar, M., *Curr. Sci.*, 1994, **67**, 769–770.

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Any debate on the present state of universities, and the need to start new elitist institutions, should take into account the changes in the sociological milieu in the country since independence. What are the changes that are relevant to a discussion on the quality of education being imparted in an ever-increasing number of colleges and universities? The diaspora of school, college and university students now come from families who have not even been remotely exposed to Victorian ethics and work culture of the ruling elite, be they Britishers or brown babus, and hence have not been influenced by the 19th century renaissance culture. This community of people sees security in life for their progeny in jobs given/procured/obtained on the basis of degrees conferred by universities; all white-collar jobs have a pre-requisite eligibility condition of a university degree. The parents of this community then consider it obligatory for a family to do everything, fair and even foul, to see that the 'child' first gets a degree, and then a DA-linked job, if possible with a sinecure of pension, and thus provide security to the family. And, of course, a job with the title of 'officer' is most desirable.

The above milieu is typical of an average Indian family, and this precludes cultivation of scientific temper, and a striving for excellence at the individual as well as group level.

The process of educating a science student in the above milieu is beset with additional problems. Rich financial rewards are forthcoming in just 4–6 years after + 2 stage for students of professional courses (engineering, medicine, architecture, management, etc.), but a science student is not sure of a job even after pursuing studies for 10–11 years (5 for M Sc, 5–6 for Ph D). All students who take up higher studies in science, leaving few exceptions, are then dis-spirited souls for they innately consider themselves as 'rejects' of the competitive examination system, time and again, at + 2, + 3, + 4 and + 5 stages.

An additional point, often overlooked, is the following. There is an enormous parental pressure on a child to work hard from the 5th or 6th standard onwards and thus be prepared well for appearing in competitive examinations. This pressure continues even in the undergraduate years of the 'child'. This is unlike the scenario in a western country, say USA, where

pressure mounts on a student only at the college level. Thus, a post graduate student in India is a tired, and more often than not a frustrated student.

As such, even in so-called good institutions, it is hard to come across bright, eager and curious students, or for that matter even young teachers, with a scientific temper.

It is not surprising then to find the academia, which is a part and parcel of the above milieu, and also happens to belong to the community of parents, adjusts readily to the path of least work and maximal returns in teaching and evaluation of students. In many a place the society lauds these efforts, and in some places extends whole-hearted cooperation as in the so-called 'copying belts'. The politician is ever responsive to these efforts.

The administrators of colleges and universities do their bit too – they confer practically time-bound promotions in the name of evaluating and recognizing merit. And at the pinnacle of this edifice is the showering of umpteen awards on the same individual for the same academic contribution.

Five decades into independent India, the above milieu, slowly but surely, corroded the university system at all levels– be it in teaching and evaluation, or in promoting intellectual excellence, or in the peer evaluation of academics. An aftermath of this is the inferiority complex of the intelligentia, leaving a few honourable exceptions, *vis-à-vis* the western academia. There is a need to address ourselves urgently to the above problems. Some suggestions are made below.

We have enough examples of attitudes of excellence in our ancient civilization that led to great levels of intellectual thinking, scientific and technological achievements (rust-free iron, finest textiles, surgical practice of plastic surgery of noses, architectural marvels of temples and mosques, etc). We ought to inculcate in the young minds respect for one's self and also for our civilization.

The student load on the university system should be reduced substantially by delinking the connection between degrees and jobs. There need not be a precondition for a person to have a Bachelor's degree in order to be eligible to be a clerk, an assistant in an office, or an officer in all sorts of organizations, public and private. Anyway, most organizations do conduct their own written and oral tests for selecting personnel (Insurance, Banking, Postal, Civil Services, etc.).

The awardees of the National (Science) Talent Search Scheme be educated at two or three places only, and made to compete amongst themselves in a 5-year programme. The places of study should be chosen carefully, and the progress of the programme monitored and made flexible to meet the changing demands of the students. And let there be a review at the end of the 5-year period to see whether this group of students are any different from any other group – whether they are intellectually satisfied with what they are doing and learning, whether they are inculcating the true scientific temper. And if the results are positive, one can even think of permitting them to take up any career they wish to (research, management or civil services), as such a group of youngsters would be a national asset and do good to all of us in any profession.

Lastly, we should look avidly for that *catalyst* that would bring a transformation in the mindset of people so that society encourages excellence at the individual and the group level.

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Amongst other things, the background to the NSU proposal recognizes and expresses sympathy for the declining and sorry plight of the Indian Universities today. Most Indian universities at present suffer from a lack of motivated faculty. Only a small percentage of the faculty are really interested in research and teaching, the majority have either lost interest or were just looking for employment in the first place. This is a long-term problem, as a solution must await their retirement. Furthermore, the universities are impoverished in terms of their work environment, which includes some of the most basic facilities such as library subscriptions, computing facilities, e-mail, money for visiting and inviting collaboration.

The NSU is supposed to serve as a model for the universities, but the question is: Will it even make contact with the universities?

There are already several centres of excellence, e.g. there are the DAE, DST and other national institutes. These institutions provide a good working environment and easy collaboration opportunities both at home and abroad. By themselves they are certainly successful. Also, young and talented faculty is very attracted to them as they are immune to the travails and pressures of a typical Indian university. Involuntarily, their effect has been to move motivated faculty from the depressed universities to these institutes. Such a pass could have been avoided if these institutes were located as autonomous centres in the universities, where the students could have access to their resources. As a matter of fact, most well-known institutes abroad have traditionally been a part of a university or closely linked to one. For example, The Institute of Advanced Study, Princeton, The Institute of Theoretical Physics, Santa Barbara, etc.

The NSU would be another such exclusive preserve outside the universities. Would it be either realistic or fair to expect its graduates to join a depressed and distant provincial University after doing international quality work? No, clearly the graduates would find more kinship abroad. The NSU would then become like some of our elitist institutes, their channels, directed abroad and not at the Indian Universities.

There is also the question of public money. If the NSU was totally a private university with useful aims, it could start a new trend of quality private universities as we have abroad, We, in India, would then set up a whole structure for private universities, which is perhaps overdue.

But if the NSU is based on a large corpus fund, (about 200 crores) to be provided from public monies, this is certainly inequitous as far as all the other impoverished universities are concerned.

There are indeed many other points of debate and the above two are the ones we have exposed to initiate a wide debate on the subject of higher education in general.

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With a concern for the common man, we present some points just to care that they are not unsaid even if they are unread.

There is a change in the attitude of youth of the country. They are worried about their future career and rightly so, due to rampant unemployment in the face of competition for jobs. Right from class one in school the child is groomed to aim at a professional career, viz. that of an engineer, medical man, a computer scientist etc. A boy who says that he would be out of this rat race and wants to live on his capability for pure science is one in a million in a year. No national science university can attract the rest in spite of their capability and potential, perhaps of a superior order than that of the 'greatest' scientist of the country in the 'most important' institution of 'national importance' or 'centre for excellence', unless and until he is assured of a career which would get him benefits comparable to what he gets by opting to go to USA after equipping himself suitably or by taking up an executive or managerial position in some leading industry in India. Just for the one in a million youth which is capable of doing something original and worthwhile (if not hitting headlines) in pure science, a national science university, and for that matter the existing special institutions, is a luxury which the country cannot afford with its teaming millions below the poverty line.

Political interference and selfishness of some scientists who were somewhat active in the past three decades – who put the acquisition of name and fame for themselves at the top and built up power blocs through committees and boards to keep themselves and scientists of their brand secure, have ruined the universities, created institutions of 'national importance' and misled the youth away from their capabilities. Exploitation of the social structure in the country for vote banks by politicians makes the word 'merit' to mean a caste. The idea of 'merit-alone in creating a new university is ruled out. Again, autonomy of educational institutions is a myth in our country. Autonomous institutions are seldom bold enough to change the pattern settled by the universities affiliated to them. Added to this the so-called enrichment of courses has made the whole system of higher education completely a farce. Students do not get marks for what they write but what an examiner decided they should get, whether the latter knows the subject or not.

Our experience is that system-wise, aptitude-wise, competence-wise special institutions like the IIT's, central institutions, centres of advanced study etc., are none the better inspite of the 'laws of social justice' not applying to some of them. Again, in the institutions of higher learning of national importance, it is more the youngsters' capability, the pressure to which he/she is put and the lavish facilities available in these institutions than the guidance and interaction with the senior scientists which helps them to come up. A new phenomenon is that a few youngsters who join these institutions leave them after 2 or 3 years for better prospects in USA. It is invariably the case that an expert, recognized so by his peers after a residence of 12–15 years in such an institution, is unable to inspire a beginner with his exposition or interaction. An investment of several crores for identifying a few experts (perhaps not more than a dozen) in 2 or 3 decades with some of these 'experts' themselves migrating to developed countries is certainly bad for this country. In fact, a concerted effort to downgrade the universities by dumping on them experts from these institutions considered 'substandard' by them has been noted in the past one decade. These important institutions have killed in this process disciplines in which some good original work was being done in other institutions by declaring the topics in which this work was done as unimportant. These special institutions are in no way comparable to university departments in eastern Europe, not to speak of comparison with other special institutions in developed countries. They have proved incapable of getting abreast of international work of importance not to speak of attracting the attention of international scientists to their work, unlike what the Russians did in the post-war period.

If really the NRIs are so dedicated now to the country which they deserted in the prime of their life for better facilities and comforts for themselves, the proposal is welcome but with the following provisions:

1. Except perhaps the land required to house the institution which may be given by the Indian Government on short or long lease, the NRIs themselves should invest in the infrastructure of the instutution expecting not even a paisa from the government.
2. It should be run as a non-profit making institution unlike self-financing professional and science colleges. The idea should not be to exploit economic liberalization.
3. It should consist of a permanent body of teachers (not necessarily researchers) who are ready to update themselves, who are wedded to the welfare of the country and its youth, who are known to inspire the youth with their exposition and depth of knowledge and who are not after money. An ideal model to emulate is the old Madras Institute of Technology.
4. The new institution should not create an impression that the existing institutions are useless. One of its main aims should be to assess the capabilities of the existing institutions in a dispassionate manner and cooperate with these institutions (not as a big-brother of course) in reorienting higher education throughout the country. With the present size of the country even hundred institutions like the NSU will not be enough to cater to the needs of the country. As Nobel Laureate S. Chandrasekhar once remarked, the importance of the existing universities in the context of higher education should not be ignored. The alumni of the new institution should not be encouraged to cultivate snobbery. They should be made to realize their responsibility towards the future of the country so that they do not go the way their elders did by declaring themselves great and others as non-entitites. It should not be as if staff and alumni of NSU will have to be invited to other institutions while those in the latter will not be invited but could go by themselves to learn in NSU.
5. The original capability of Indians in keen memory and computation should not be altogether forsaken in the structuring of courses in the NSU. If we have to make a mark in originality these strong traits will have to play a role. There should be a lot of options for students in combination of courses. This is where BITS, Pilani succeeded with no great contribution in teaching and this is where all universities failed.
6. Evaluation should be credible with the teacher alone responsible for continuous evaluation, with of course, checks for errors of judgement. The staff and courses

also should be evaluated by the students.
7. There are NRI scientists who consider themselves as custodians of science for our country and for whom certain Indian scientists and topics of study alone matter. If NSU were to be promoted by these scientists it is very remote that NSU serves the country. More than the prestige that we do science comparable with that of developed countries by showing up a few experts acceptable to the scientists elsewhere, we need to build up confidence in our youth that we are capable of original work (not tinkering as of now) which the rest of the world will have to value and which is of use in our country and for our country.
8. Any concessions shown in fund generation and certification should be strictly audited by an independent and competent agency.
9. There has been so far no assessment of the spending in the institutions of national importance some of which have the cover of agencies like DAE or the Planning Commission. It is high time that the investment made by the government in them inclusive of the expenses of experts in visits abroad in terms of money and material is let known to the public. The outcome of this investment in terms of significant work which had impact on world science or the life of the common man in our country should also be evaluated dispassionately by a committee which consists of experts not connected with these institutions from India and abroad. Such an evaluation would help in arriving at proper priorities for the NSU.
10. The NSU should not be concerned only with post-school science education. The choice of personnel for NSU should be in such a way that they show concern in cultivating interest in and popularizing science and original thinking in children right from the primary stage.

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Swadesh Mahajan's proposal to set up a National Science University (NSU) in India reflects that our NRI colleagues are beginning to show concern for the development of scientific environment in 'Swadesh'. It seems that Mahajan is completely disillusioned with the prevailing state of affairs in the field of science and technology in India. But what appears like an allegation by Mahajan – that scientific establishment in India is managed by a few extremely powerful people – was, in fact, a necessity in the initial post-Independence period. The country needed such important and powerful persons who had full faith and support from its leaders. And it is these very people who laid the foundation and raised a platform with basic amenities and a reasonably good number of laboratories to quench our thirst for science. Their efforts put India (once considered a land of snakes and sadhus) in tune with the league of international scientific community. These 'powerful persons' had one thing common among them, viz. in spite of their personal differences they worked as a cohesive force and their combined efforts resulted in the development of a science policy, planning, management and different scientific departments at governmental level.

It would be unwise if we wholeheartedly ignore their capabilities. Mahajan or other leading personalities are now in a position to condemn the affairs of Indian science and scientists only because they know we have sufficiently equipped laboratories and potentially competent younger generation of scientists, who in spite of all the hardships have carved out a 'small niche' for themselves in the scientific community. The erstwhile powerful persons are aware of this sort of development and circumstantially they are now sitting in the outer periphery of scientific management. Establishment of NSU at this stage will again put the strings in their hands because as per Mahajan's proposal the management trust of NSU will consist of retired academics, intellectually oriented politicians and doyens of industry. These persons will obviously be selected/nominated by the so-called earlier powerful persons and in the process another lot of powerful persons will form a new coterie of science managers. Being one of the supreme and highly budgeted organization, NSU managers will have a natural edge over others.

In order to avoid such a situation, a long-term policy needs to be drawn to attract and absorb fresh trained scientists on completion of their Ph D. To start with they may work as scientific assistants for 2–3 years and then get absorbed in the mainstream of scientists after proper scrutiny and selection. For a better future, therefore, instead of looking to the western world, NRIs and NSU for lucrative offers, we should consider the Indian conditions and take care of our young frustrated scientists who are unable to find their place in science and society due to their temporary and *ad hoc* positions.

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A layman's views on 'Science in India'

After going through the special section on NSU in *Current Science* (1994, **67**, 502–520), I would like to express some long-standing, personal views on 'Science in India', as a lay-person.

In our (primary and secondary) education system there is no method of identifying the aptitudes of children. Talent exists among students of all schools, irrespective of their academic stature or location (rural/urban). Methods need to be devised to identify aptitude for science among school children. One classic example is that of Ramanujan, whose genius in mathematics was not detected at a very early stage.

Children are not aware of science as a profession. Ask children what they want to become in future, and the answers one gets are 'doctor', 'engineer', 'IAS officer', etc. But it is hard to spot children who want to become scientists. Excepting places where there are research institutions, people in general are unaware of science as a profession (?), or of any serious research being done in India. This is partly because of the fact that majority