

## Iconoclastic thinking needed

Encouraging divergent and critical views expressed by ordinary readers like me, being published in *Current Science* was a welcome change initiated in the beginning of 1990s. Editorials too have, quite often, raised important questions. However it would be better to pause and ask whether the debates/criticisms have made any impact on the state of science and the functioning of scientific institutions in India. I believe they have not; Balaram<sup>1</sup> also admits this while quoting Mahajan in his editorial. What could be the possible reasons? Let us analyse this editorial.

Appointment of NRIs to head premier science institutions in India, and comments in a US science magazine prompted this editorial. Why should everything published in *Nature* or *Science* (USA) about India invite the attention of the *Current Science* editor? It is, in fact, a reflection of the typical mindset that views both failures and achievements through the prism of the Westerners. For the same reason, harsh comments of an NRI find a place in the editorial, ignoring my critique on the Indian science establishment<sup>2</sup>. The reader is urged to peruse my letter that has comments on Mahajan's article<sup>3</sup>. Is there any substantial issue raised in the *Science* report, and Balaram's response? Most of the top IIT graduates had been leaving the country every year, since the inception of the IITs (officially acknowledged in the Nayudamma Committee Report, 1980). Perhaps an unwritten policy exists, though I am not sure, that a candidate must be Ph D/ PDF from a foreign university/institute for faculty appointments in IITs. The so-called eminent scientists in premier institutes have been pursuing self-serving, short-sighted

policies, and promoting mediocre and pliable scientists to key positions. Therefore, the issue raised in this editorial revolves around the clash of interest between the two groups and is irrelevant for dedicated 'resident scientists'.

It is ironic that in dismissing the NRI issue Balaram favours luring 'accomplished Indian expatriates', and cites the China example. It is high time that at least the scientific community realizes that any NRI scientist seeking privileges 'to serve the motherland' has vested interest, and must be firmly told that India does not need him/her, however eminent he/she may be. Is it not the greatest tragedy that since independence we have tried to copy alien models? Is there no Indian model?

People of limited intellect need slogans and icons; in India, the so-called icons are responsible for creating the 'talented few syndrome'. As a result, majority of colleges and universities starve for meagre funds to manage modest laboratories and libraries, and in stark contrast, the elite institutes waste colossal money to imitate the West, borrowing fashionable research topics and building campuses on their pattern. They have misdirected the whole process of education and research in the guise of excellence.

Perhaps we should look for inspiration, and for that the deprived and poor offer a glimmer of hope. Two examples – recent newspaper reports – highlighted that poor children studying with lantern lights could score more than 80% marks in a selection exam to provide scholarships for study in Kolkata (incidentally, instituted by an NRI, but that is not important). I recall that just after three

months of the supercyclone in Orissa, the students in Garh Bishnupur of Ersama were eager to interact with me and were worried about their education. In fact, one of the teachers gave me a list of more than 20 experiments that they would have liked to introduce in their school. In 2000, the Orissa government abolished non-formal centres. Readers will be surprised to know that a teacher in such a centre was getting Rs 200 per month as salary, and even that has been stopped. Is it not a miracle that in spite of all this we get many talented students from the villages. A quick calculation shows that within less than 2.5 crore rupees 10,000 such schools can be supported per year; but everyone accepts the argument that the money is wasted as most of the teachers do not run the centres properly. In contrast, crores of rupees are granted to centres of excellence that produce routine papers, and there is no accountability. Even if 80% of the funds is not used in schools, imagine the number of students who will get access to education. Could we think along these lines?

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1. Balaram, P., *Curr. Sci.*, 2002, **83**, 1297–1298.
  2. Tiwari, Suresh, *Curr. Sci.*, 1994, **66**, 14.
  3. Tiwari, Suresh, *Curr. Sci.*, 1995, **69**, 213.
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## Why concern for quality

Francis Bacon said almost three centuries ago that 'knowledge is power'. Knowledge as the resource as well as the agent of change has played a vital role in shaping human civilization. Knowledge in science and technology (S&T) has annihilated distance, integrated nations and has made the world 'a global village'. A

country like Japan is an affluent, economic giant because of its supremacy of knowledge in S&T, despite its paucity of natural resources. The ability to create new knowledge and the capacity to apply new knowledge for development has become the barometer of affluence. The United Kingdom was affluent and was an

economic power when it had the lion's share of Nobel prizes. The centre of gravity of affluence as well as the lion's share of Nobel prizes have now shifted to USA, because of its supremacy in creating new knowledge and its capacity in applying new knowledge for development.

The ability to create new knowledge and the capacity to apply knowledge for development depend entirely on the quality of the human capital. Universities are the gold mine of human capital and are the nurseries for creative talents to sprout. The ability to create new knowledge is almost synonymous with publication of papers with high citation counts. It is a matter of regret that papers with 'thousand citation counts' are either non-existent or rare with researchers at various national research institutes in India with fabulous funding, and equivalently, paper with 'hundred citation counts' is extremely rare with researchers at ill-funded state universities of India with heavy teaching load<sup>1</sup>. The selection of personnel with deplorable academic credentials is the primary reason for decline in the quality of education.

Higher education costs money. The Sarcar Committee appointed to plan IIT Kharagpur had calculated the cost of education at Rs 1460 per year per student at the Imperial College, London and Rs 1520 at MIT, Boston. On that basis,

the Government of India had funded the IIT at the rate of Rs 1500 per student per year. The elite educational institutions like IITs were funded then at the same level as the best of the world<sup>2</sup>. It is unfortunate that there is considerable reduction in government funding even for educational Indian institutions like IITs at present compared to the best in the world. The less said about the deplorable funding situations of the state-funded universities, the better it is. Why did it happen? It is perhaps because over the years, not only have the authorities of educational institutes become sterile intellectuals<sup>3</sup> and behave like chameleons, but there is also deplorable decline in the quality and also the vision of the political masters as well as the authorities of the universities, who are concerned only with power. It is unfortunate that instead of safeguarding academic quality, academic freedom, rule of law, and providing required infrastructure comparable to the best in the globe, the concerned authorities are taking shelter behind slogans of globalization, liberalization

and privatization to cover-up their failures on the said counts and to justify their surrendering the field of education to private entrepreneurs. The legalized system of 'payment seats' has encouraged corrupt politicians, incompetent lawyers and entrepreneurs who are miles away from education, to establish commercial undertakings as their family business, in the name of educational institutes. In the absence of adequate safeguards on quality, these developments will definitely provide the recipe for disaster.

1. Basa, D. K., *Curr. Sci.*, 2001, **80**, 1364.
2. Kalshian, R., *Outlook*, 23 October 2000, pp. 56–66.
3. Basa, D. K., *Curr. Sci.*, 2002, **82**, 1192–1193.

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## Public engagement with mathematics in India

Mathematics pervades our everyday life. It is a branch of knowledge where a 'problem' is a good thing and makes the work of a mathematician interesting<sup>1</sup>. Yet, mathematics research<sup>2</sup> and teaching<sup>3</sup> are on the decline in India. I would like to suggest that a solution to such a situation is engagement of public and specifically children with mathematics.

In an interesting article, Raghunathan<sup>4</sup> notes that mathematics is reaching crisis proportions due to socio-economic factors and suggests measures to improve the economic status of our teachers, and generation of employment for bright students who take up mathematics for study. True, but it seems to me that vital points are being missed here on the reasons for declining standards in mathematics and on ways to improve the situation.

While stating the factors responsible for the deplorable condition of mathematics in India, Raghunathan says that our country has a vague feeling that we are very good at mathematics, but that is not the actual case. He also contests the dubious

claims on behalf of Vedic mathematics. But we should acknowledge that different civilizations have developed a variety of mathematical ideas throughout the world, that may be different from what we study in the formal subject called mathematics. But, these native mathematical ideas provide the initial platform for children to learn the notions of numbers, logic, forms, measurement, patterns and spatial configuration prevalent locally<sup>5,6</sup>. The present education system or the present generation of scientists, engineers and scholars should under no circumstances ignore this initial cognitive support to a child. Thus, we cannot underestimate Vedic mathematics. In fact, such systems may have acted as seeds of modern mathematics in ways we do not know yet. Because we have forgotten these systems, basic love for mathematics among children is also dwindling.

In order to improve the situation, we must inculcate the spirit of scientific innovations, including the love of mathematics in young children<sup>7</sup>, because that is the only way to increase the endangered

global population of a handful of mathematicians that number less than 10,000 worldwide<sup>1</sup>.

Furthermore, as correctly recognized by Raghunathan, the problem of decay in mathematics is socio-economic. Hence, it would require a socio-economic solution. In this connection, I would like to invite the attention of parents, children and young people that mathematical skills lead to significant wage premiums in men and women as shown in a recent study in USA by Aparna Mitra<sup>8</sup>. The study also shows that 'women with superior mathematics skill experience wage gains that are comparable to or higher than the wage premiums enjoyed by men'<sup>8</sup>. Encouraging girls to spend more time in high-school mathematics can greatly improve their quantitative skills. Thus there is an added reason for inculcating the love of mathematics particularly among girls, as it is one of the ways to reduce the wage gap between men and women<sup>8</sup>.

Finally, while we desperately need great mathematicians who can advance