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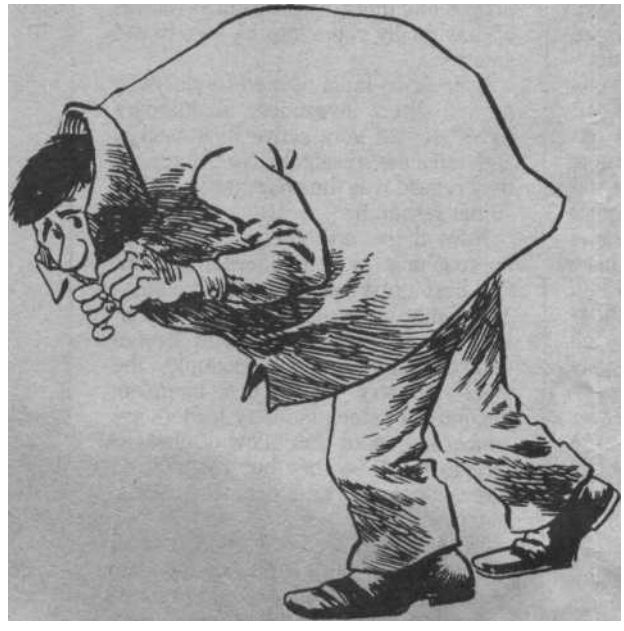
# Nurturing the Indian

For breakthroughs in technology, our acadamic system shou encourage enquiry and innovation, says *S Venkitaramanai*

Illustrations by R PR



In the fascinating book, "The level of riches", economic historian Joel Mokyr discusses the founts of technological creativity. The global race for innova tion and investment will decide which nation will dominate the 21st century. Mokyr points out how technical innovation answers the economist' cliche that there are no free lunches. Increase in global production over the last few decades is the result of technical breakthroughs, demonstrating their impor tance in economic progress.

From time to time, questions have been raised why certain nations, like India, have been lagging behind in innovation. Many societies have been known to generate great bursts of innovation and then subside into inactivity. For instance, in AD 1400, China moved much faster than Europe in technol ogy; leading the world in the use of blast fur naces, gunpowder and marine technology. China invented paper; an invention that took more than a thousand years to reach the west. After the fifteenth century, the Chi nese contribution to technology ceased. Chinese learning then became "mired in an obsolete traditionalism". Similarly, earlier Indian thinkers had contributed great con cepts to metallurgy, medicine and mathe matics. India's iron and steel making was legendary even during the time of Alexan der's invasion.

Richard Feynman, the maverick phycist and Nobel Prize winner, has an anecdote which may explain part of the reason. Feyn man had taken a few years off from his teaching and research post in Caltech to teach young Brazilian students. In his brilliant memoir "Surely you must be joking, Mr Feynman?", he recounts how the Brazilian students were absolutely superb in regurgitating what he taught them; but any question out of the way, and they found it difficult to answer. On the contrary, the "recall" in Caltech would have been much less perfect; but there would have been more enquiring questions.

This, to a large extent, typifies the prob lem of Indians learning in India. It is the result of the atrophy of the spirit of enquiry. Or, it may be because dissent is considered disobedience. Many of us, as parents, have encountered our children coming back from school to learn by heart some material given by the teacher. But, they dare not question this material even if they know it is wrong, for fear of offending the teacher. A spirit of enquiry is welcomed neither by the teacher nor by the student. This is, of course, not true in elite institutions, like the IITs and the IIMs. But it is definitely true of our schools and colleges in general. "Don't bother me with too many questions; here are the notes and you will get good marks if you learn then" is the standard attitude.

The attitude of defeatism is one of the reasons for the lack of technological cre ativity. "We cannot do it" seems *to* be the national mood. The science laboratories have of course done their bit, but they have scratched only the surface. Few of our industries take pride in their new ideas, and the R&D effort. The focus of our industrial leaders is on financial engineering, market ing coups and take-over bids. Very few of them have shown the vision to encourage innovation, research and development. There are honourable exceptions, but they may remain just that - exceptions.

The next best thing to innovation is copying. The Japanese and the Chinese have shown how adept they are in this. Indeed, as soon as an idea comes out of the US laboratories, the Japanese industry copies it and adapts. The video-recorder, the transistor, the photocopier, the com puter and the microchip are instances inventionswhichtheJapanesehavecopied and adapted in such a way that they are ma ters in these sectors. The same is true of the new concept of "fuzzy logic" - a logic the pays homage to reality which is neith black nor white. Fuzzy logic was invent in USA twenty odd years ago. The greate adaptions of fuzzy logic are in Japan ar China.

If innovation is to flourish in Indian sc hools and colleges and industry, there has 1 be a sharp change in attitude. In agriculture thanks to Dr M S Swaminathan's pionee ing leadership, a great deal happened at on time. India led the world in adaptiv research, if not in fundamental work. On does not see this in other areas. Encourag enquiry, permit dissent and reward inven tion. This is a task which should embrac our schools, colleges and industry.

A great deal depends on our schools, col leges and textbooks. The Japanese and the Chinese also have a system of educatioi which goes a lot by rote. But, the pursuit o excellence in their educational institution is unrelenting. In China, for instance, even the latest textbooks published in USA are

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made available; or at least that is the declared objective. Above all, the attitude of our teachers and that of the public to the teachers, has to change. Much has been done - may be not enough - to upgrade the remuneration and service conditions of teachers in our colleges. But that by itself is not sufficient. If India's schools and colleges are to equal their peers in USA, Germany or UK, we should make investment in education and educators a top priority. We should honour our teachers, not only in terms of emoluments but also by their place in society. This is a task for our education planners and political leaders.

Many of the schools of excellence abroad have been founded by donations from industry and business. The Sloan School, the Carnegie Mellon University, Stanford, Kellogg University- even the names shows the founts of private charity for public excellence. There has to be a structure of fiscal incentive to enable this, accompanied by a sense of pride among private philanthropists who help education. Some recent -welcome- changes in income-tax have made donations to deemed universities also eligible for liberal tax concessions. More innovative tax incentives are needed.

Why does a Khurana, a Chandrasekhar, a Karmarkar, a Petroda flourish abroad, and get rejected in India? What should we do to create an atmosphere which encourages many more of them to come up? What should we do to disturb the traditions of implicit obedience to authority and rejection of dissent which seem to permeate most of our institutions? In short, this is the question which should concern us, when we envision the march of India into the twenty-first century. An India that does not innovate and cannot be at the forefront of science and technology will become the sickman of the world, whatever be the financial wizardry and economic statesmanship of its political leaders.

To elevate the spirit of scientific enquiry o a higher pedestal, to remake our schools and universities as places of excellence, comparablewith the best in the world, and to introduce science and technology at the op of the agenda - these are tasks the national leadership should assume. Will hey take time off from their internal feuds towrestle with this vital problem? In the leight of our freedom struggle, Pandit Jawaharlal Nehru devoted time and attenion to this issue. Can free India's leaders today afford to do it?