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GUEST EDITORIAL

Who are 'people of genius'?

Popular press, often even science administrators, keep asking the questions why has not India produced Ramans, Ramanujans and Boses since independence. Those people (and Einsteins of the West) would rise to excellence irrespective of the system. They are not product of the system. They just happen. That is why those are rare and whenever they happen, they become demi gods. Such phenomena in any human society are inexplicable and their number cannot be used as a measure of success of any science enterprise. Except the likes of above, scientists need system support to excel. Most Nobel laureates of post-second world war give credit to the university where they had early education and to the ambiance in their working place, which enabled them to carry out excellent work. How do we know which university/institute is the good place to get educated and/or to work?

Various ranking systems are being used (promoted?) these days as measures of quality. QS World University Rankings®, TIME Higher Education Ranking, Shanghai Ranking, etc. are all trying to tell us how good an organization's average is. If the averages were higher, the people at the top would reach greater heights of scientific excellence. Again, both popular press and science administrators keep asking the question why isn't any university/institute in India as good as MIT or Caltech? Is that really so? What about IITs/agriculture universities for undergraduate education or JNU, HCU, etc. for postgraduate education or IARI, IISc, TIFR, CSIR Labs, etc. as work places to carry out high-quality research? Such organizations have led the transformation of a complex country of very diverse 1.2 billion people in less than two human generations using only peaceful democratic tools. Reasons for this puzzle may lie in what the above-mentioned ranking systems measure (for example, publications in top-rated science journals, internationalization, etc.) and what they do not (for example, national/local impact of teaching and learning).

Of course, no doubt that when it comes to research in basic science or technology transferred to industry, we are no way near world's best. How do we reach the list of world's top 100 of such research organizations? In 1945, James Bryant Conant, then President of Harvard University said, 'There is only one proved method of assisting the advancement of pure science – that of picking men of genius, backing them heavily, and leaving them to direct themselves.'[1] Except that *men of genius* should be read as *people of genius*, this is an all time relevant statement. A large number of excellent scientists under one roof would become such a formidable force that no bureaucracy would be able to slow them down, rather they transform the administration as an enabling force. Then the question is where do we find 'people of genius'? As large majority of any population is born with similar levels of curiosity, creativity and learning abilities, it is the education that makes them genius for the job they are hired for. Therefore, if average quality of research in India is not good, we should blame our education system. Then how is that we have made tremendous progress in agriculture, engineering, space, medicine?

We have witnessed accelerated transformation of India in the past 20 years. Seeding for this change happened immediately after independence, when we set up excellent engineering schools, agriculture/medical colleges and universities. They produced people of genius who scripted not just Indian growth story, but triggered global transformation. But for these geniuses working in India and overseas (some may call it as brain drain, but the dynamics of the world of science and technology and the global economy call it brain gain), we would not have seen FDI flowing to India since 1990s or India becoming the 3rd or the 4th largest economy in the world. If the world's best universities and industries have recognized graduates from India as 'people of genius', our professional education system must have got its curriculum right. If IITs had not introduced Computer Science degree even before Bill Gates of USA knew anything about computers, the Indian growth story would not have been what it is today. I would go a step further and say that the world would not have seen the kind of economic growth that we are witnessing today.

While our professional education system has met with intended goals in the recent past, our general education has somehow failed. Still, there is so much of resistance to change our general education system. We are crying for change in our politics, the way government functions, the attitude of men towards women, the attitude of haves

towards have-nots, etc., but we resist changes to our curriculum that should enable all these changes! As 'change is the only thing that is constant'; all societies would change anyway, albeit passively and slowly. However, such a change will be more like random walk, only few will benefit, while a large majority of the society would continue to suffer. Education in the human society *evolved* to accelerate and give a direction to changes in the society. It is therefore ironical that we have put a strong 7-walled fort around our education system and thereby, put a break to all positive changes in the society.

Some may claim that it is not that we resist changes to our curriculum, we do not have a consensus on what should be the new curriculum. After all, we are argumentative Indians! Hopefully, one day we will overcome apprehensions in our mind on the perceived negative impact of changing the curriculum and visualize guaranteed benefits for the future. Here are few things what we should keep in mind, if and when we decide to make sweeping changes to our education system.

1. Evolutionary biology tells us that genetic diversity in a species is relatively more important than the size of the population for its survival in a continuously changing environment. As it would be difficult to predict the needs of the future, our education has to be broad based such that variety of skill sets would be available in the population. A country of 1.2 billion people that would soon achieve 30% GER (means 18 million more students coming to tertiary education[2]), a country with multiple languages and cultural diversity, cannot depend on a uniform curriculum. Otherwise, even while we continue to send indigenous rockets to the Mars, we would depend on knowledge developed elsewhere to keep our lands green. Diversity in curriculum also helps to take full advantage of our, much talked about, demographic dividend and would meet the needs of the skilled human resources of the world (in today's political system we may call them immigrants, but they are the same explorers of the migrating humanity of earlier millennia).

2. Tertiary education in India is largely provided by private educational organizations (nearly 60% of all enrollment is in private colleges/universities[2]). By making education a not-for-profit activity and keeping them under the tight control of local universities, we have halted bold changes to the curriculum that could have happened in some of these organizations. While it is important to be vigilant and prevent exploitation of innocent public, too much governance is only an impediment to the positive change that would naturally emerge in a large demand–supply chain.

3. We have come a long way in shedding our prejudices against FDI. Attracting FDI is not just about attracting financial investments, it is about adopting best management practices of the world. We now accept FDI even in defense and insurance as routine policy decisions. But, we resist FDI in developing good educational organizations. Allow foreign universities to set up their campuses and let them bring another dimension to our education system. It will only expand the diversity in the skill sets of the population. Not allowing foreign universities has not stopped aspiring young Indians to explore and be exploited in far away places. At least, we can keep a vigilant eye on foreign universities on Indian soil and protect gullible people!

4. When it comes to reforms in education or setting up new universities/institutes, we should be aware that any benefit of these initiatives would be realized only in generation-timescale (20–30 years). Best example, IITs that were set up in 1950s and 1960s helped to change Indian economy and thereby the society in 1990–2010. We should, therefore, resolve to provide uninterrupted long-term support to educational organizations.

5. We need to enthuse both teachers and students to work towards building excellent centers of science education and garner public support for the same. For this, we should make science education a movement of people. India is uniquely placed in this context. We are argumentative people, because (at least, let us assume that) rational thinking is part of our culture! This strength should be exploited and make the society science-literate. DST's INSPIRE[3] is an excellent programme in this direction, which should be further expanded to involve all school/college teachers and students in taking up small projects on water, energy, earth and epidemic diseases. The programme should be designed such a way that teachers and students learn fundamental concepts of science while doing these projects and at the same time generate large-scale data. One example, as part of International Year of Chemistry[4], a large number of students and teachers all over the world were involved in developing a pH-map of the earth. Such mission-projects are educational for the general public and at the same time, generate data for R&D. People participation in science programmes may also lead to increase in the number of sentences in the election manifesto of all political parties. Such positive feedback loop is much needed to ensure continual support to ever evolving education programmes.

1. Letter to the Editor, *New York Times*, 13 August 1945, p. 18.
2. http://www.ey.com/Publication/vwLUAssets/Higher_Education_in_India/$FILE/EY-FICC_Higher_Education_Report_Nov12.pdf
3. http://www.inspire-dst.gov.in/
4. http://water.chemistry2011.org

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