

An unhealthy exam system It's time for knowledge-based education

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MOTHER bird and baby bird were in the nest. Father bird would bring in grain and deposit it on the floor of the nest from where mother bird would pick it up and feed the baby. Suddenly, the mother died. The father continued to bring in food, but the link had been broken. In spite of the abundance of food in the nest, the baby bird died of starvation.

This is not an apocryphal story but a true observation by a bird-watcher. A country's education system is like the mother bird. If it is decapitated, future will be in jeopardy irrespective of the strengths and accumulations elsewhere. It is ironic that while the world over the economy is increasingly being driven by knowledge, the knowledge content of our own education system has been going down precipitously. Indian education has been distorted out of shape by the examination system. It has ceased to be enhancing and has become rejectionist instead.

In the years immediately after Independence, the catchment area of science and engineering education was consciously expanded. We have, however, been unable to effectively exploit this valuable human resource capital. Unable to deal with students, whose number runs into lakhs, we have created mechanisms to reject them stage after stage so that finally we are left with numbers in thousands which we can handle. Throughout the world, science students are given a good grounding in the basic concepts, taught to do experiments and undergo practical training. We have sacrificed all these at the altar of multiple-choice questions. The aim of our elaborate expensive state-run education system has degenerated into "objectively" ranking the students, accommodate the top few thousands of them, and condemn the rest. No wonder then, instances of question paper leakage and falsification of mark-sheets are becoming more and more pervasive.

Devaluation of science and engineering education in India has taken place at a time when the knowledge content of the economy the world over has been increasing. A knowledge(-based) economy has been defined as "an economy in which the production, distribution, and use of knowledge is the main driver of growth, wealth creation and employment across all countries". Revolutionary technological advances such as powerful personal computers, high-speed tele-communication, Internet, and molecular manipulation of matter have given rise to "new industries that are driven not by machinery, skilled shop-floor workers or even capital — although these play a role — but rather by individuals engaged in research, design, and development". Information and communication technologies (ICT) and biotechnology (BT) are of vital importance today. Yet knowledge-based economy goes beyond them. Older sectors are also organising work around new technologies so as to develop new managerial practices, cut costs, save energy, reduce waste, and tap new markets.

One often comes across the term "high technology". It is not a very useful concept because it cannot be paired with any other term. It is far more instructive to distinguish between rising and flat technologies. A rising technology is one which is currently in a

rapid phase of development. A flat technology on the other hand, is one which has already been more or less standardised. Quite obviously, a rising technology of today is a flat technology of tomorrow. The US and to a lesser extent other economically advanced countries tend to drive their economy through rising technologies, parcelling out production based on flat technologies to lesser countries. These in turn keep the higher end of flat technologies to themselves and pass on the lower end to countries down the line.

In the present era, ICTs have a dual role. They are themselves in the developmental phase. At the same time, they constitute a powerful tool necessary for making flat technologies globally competitive. Indeed, in the years to come ICT itself will reach a plateau; and economic success will attend those who are able to master their use as a tool. (American retail chain Wal-Mart is a striking example of success in this field).

Much international praise has been showered on India's IT prowess. Such praise is not disinterested and, therefore, should not be taken very seriously. Most of the IT work being done in India under Indian auspices is of low calibre, much below the intellectual level of workers engaged in it. Chances of India's moving up the value ladder are small because it still ranks very low in network readiness. As a study underway at the National Institute of Science, Technology and Development Studies, New Delhi, by Dr Sujit Bhattacharya reveals, whatever cutting edge R&D work is being done in India in IT and related fields is under foreign auspices and is being patented in the name of the parent company in the US.

In the year 2001, American companies obtained a total of 65 patents based on the work done by Indians in the Indian branches of these companies. (The number stood at 19 in 1997). All these patents are in the fields related to computers and communications. In contrast to these 65 patents, Indian organisations obtained 121 patents (up from 31 in 1997). These are in traditional areas such as chemicals and drugs.

Ten years from now when analysts look back at the present period, they would notice that India played a minor role while ICTs were in the rapid phase of development. India's destiny does not lie on the periphery of a rising technology but at the centre of flat technologies. Many technologies which had been closed for long are now being reopened for ecological and economic reasons. Old processes are being reworked to make them environment-friendly. Also innovations of technological, managerial and other kinds are being pressed in to make products globally acceptable and competitive.

There is a major difference between India and its competing neighbour, China. China must necessarily, at least for the present, work at the low-skill end of the flat technologies while India is capable of becoming a hub for production requiring higher levels of skills, in sectors such as pharmaceuticals, automobiles and steel. Since India already has the culture of the production in these sectors, it can easily move up the value ladder. Of particular importance is the pharma sector where India can become a world leader in production of drugs that go off the patent. On this bedrock can rest R&D, leading to new useful molecules.

Where would the human resource capital come from for these sectors? Sadly, our university system has so far shown no signs of rising to the occasion. In keeping with the demands of the time, our universities must be able to act, change and adapt at short notice. Universities must anticipate industry's needs and fulfil them. New economic order has

features the likes of which the world has not seen before. Competition today is global rather than national; and organisations networked rather than hierarchical. Competitive advantage comes from innovation and all-round cost-cutting. Work-force should have broad (rather than job-specific) skills, which should continually be upgraded. Universities in the region should take initiatives keeping in mind the long-term interests of their learners.

- Punjab, Haryana and Chandigarh should work together to ensure that conceptual learning is emphasised at the 10+2 level. The CET system for admission to the degree courses should either be dispensed with altogether or drastically revised. As it stands, it is cruel, counterproductive, and wasteful.
- Universities should monitor the needs of industry and cater to them. For example, contemporary manpower requirements of the pharma and automobile sectors should be met
- The expertise available in specialist institutions, such as the Institute of Microbial Technology and the National Institute for Pharmaceutical Education and Research, should be utilised for university/college teaching.
- Universities should introduce a modular form of teaching, permitting a student to obtain a certificate/diploma, enter the job market, and subsequently return for a degree.

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