

## Science education and job training in India

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The developed nations always have their priorities in scientific and technological advancements. Researchers in the developed nations are working on mathematical modelling of nanometre-size materials. Fast computing techniques are used to generate virtual materials to study their various properties. These materials are transformed into actual materials in the laboratories which are then fabricated on a commercial scale. This process has brought about a revolution in space technology, communication, agriculture, power generation, medicine, and so on. These advancements have gone to the extent that the basic concepts of food, disease treatment, defence strategy and travelling have changed altogether. While all this is happening in the developed nations, we in India are still talking about nano science and technology as a policy matter.

The key to the progress of developed nations is the quality of education and training given to their talented students. The important features of their science education and training are as follows: (i) Postgraduate teaching in science, engineering and medicine is imparted to the selected students with proven ability in basic sciences, mathematics and computing techniques. The teaching laboratories are well equipped to test new ideas, to create new data and to fabricate new machines. Courses are taught by committed teachers of established reputation in the subjects. (ii) The leading industries have their own laboratories. Qualified scientists and engineers are appointed in these laboratories to work together to create a new product and to transfer the laboratory prototype into a commercially viable market product. (iii) The educational institutions and industries work together as a national policy. Industries support research projects of their interest in educational institutions. The government provides financial and administrative support, with full accountability and control, to achieve the goals of national pride and priority in the industrial products. New products are patented under the intellectual property right for financial gains by the industries and the nation as a whole.

In our country, the education system has gone through many changes in the last two decades. As quick financial gain

has become the priority, the stress is on information rather than on conceptual clarity, and employment priority has taken over knowledge gain. Certainly, it has led to better economy which is very much needed. However, in this process the young generation get gainful employment in the service sector only. There are not many students who want to get involved in scientific, technical and industrial research to generate new ideas and new products. With the result, we are continuously lagging behind in creativity sectors in science, technology and industry. To accomplish the India of our dreams – a developed nation by 2020 – with priorities in science, technology and industry, there is an urgent need to reformulate science education and job training policy.

### Primary education (1–8 standard)

Primary education with emphasis on mathematics and language should be only in one's mother tongue. This will enhance the originality and creativity of young minds. They will grow up as more confident people. Science is generated through laboratory experiments, where ideas are transformed into reality and reality generates new ideas. Therefore, basic science subjects along with computing techniques should be taught thoroughly through exhaustive laboratory work. The moral, cultural and social values of the Indian system must be profoundly inculcated at this stage through art, music, dance, painting, crafts and sports to generate a harmonious society and a sense of national pride in the young minds.

### Intermediate education (9–12 standard)

In this age group, students should be trained in vocational courses according to regional requirements of the various industries, agriculture and for self-employment. The industrial training and technical institutes should be expanded to train the required manpower for the industry. All efforts should be made such that a large number of students, in this

age group get employed/self-employed suitably and profitably. The students should be taught social sciences and two languages other than the mother tongue.

### Rural development programme

In the intermediate education, well-focused programmes for technical education and employment should be provided for students from rural areas. A sincere effort should be made to train the interested students in traditional Indian skills such as wood-work, metal-work, jewellery, leather-work, fish breeding, fruit, flower and vegetable growing, folk music and dance and other forms of art and craft. Modern technology should be adopted to fabricate profitable products to regain the village economy. This will reduce migration from the village to the city. Economic growth in rural areas will help parents of bright students to pay for their higher education. This will bring many outstanding creative minds from the rural areas to the mainstream of national development.

### Graduation

Graduate education should be focused on higher level human resources development for industry, agriculture, education, engineering, medicine, basic sciences and social sciences. These graduates should be trained to the extent that they become a dependable work force for national development in all sectors, including administration, infrastructure, defence, banking, etc. To further strengthen the confidence and sense of national pride, the ancient Indian achievements in the knowledge sector should also be taught to these students. There should be ample job opportunities for these graduates to get absorbed effectively in public, private and self-employment sectors for national development.

### Postgraduate education

Postgraduate education should focus on the areas of national development. There

must be an aptitude test for admission to postgraduate courses. Meritorious students who are genuinely interested in creating and dispersing knowledge, should be admitted to postgraduate courses, only in recognized universities that have full financial support from Central/State governments. These talented students should be groomed in micro sciences and micro technologies to give shape to new ideas for human development through updated libraries and laboratories. They should take up new projects to develop expertise of international standards. Students with academic aptitude should be motivated to take up teaching jobs to keep the system

percolating with higher academic traditions from primary to postgraduate teaching.

#### **Appointment of teachers**

Teachers play the most significant role right from primary to university teaching. The sole criterion to appoint a teacher must be aptitude, morals, academic achievements and a sense of commitment towards the young generation. There must be no compromise on the quality of a teacher at any stage whatsoever, if we are committed to nation-building.

In the above process, young minds will be trained to be creative and confident.

Their education and training will make them disciplined citizens. Rural India will get a boost in employment and economy. Well-trained graduates will be responsible for national development. Intellectual postgraduates will give new directions through teaching and research programmes to build a confident nation. This is what we are dreaming about for a developed nation through scientific education and job training.

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