

TECHNOLOGY AND THE SCIENCES

THE Government of India appears to be taking a new look at science. The reconstitution of the National Committee on Science and Technology (NCST) is its latest effort in this direction.

That India has made tremendous progress since independence in science and technology has been recognized by several unbiased observers. The great variety of industrial products which she can manufacture has astonished many advanced countries and the unqualified praise for her ability to produce sophisticated equipment, accorded by the highly industrialized nations, has been genuine as well as unequivocal. India has emerged during this period as a strong exporter of finished goods of consumer interest. The employment of her technical abilities to manufacture a great variety of products has conferred on India the distinction of a potentially strong competitor in world markets—a position which is looked upon with some apprehension by the traditionally industrial nations of the world.

The association of science with technology and industry-biased research is an old and well-established historical fact. Our early planners clearly saw the link between basic science and its applications. In the constitution of a number of laboratories under the CSIR and in the encouragement given to agriculture, medicine and defence, this role of science was recognized. Our technical and industrial development is not a little due to the filip provided in the early days of our independence for not only encouraging science but also emphasizing the urgency of applying it to the industrial advancement of the country. This association clearly has conferred enduring benefits and made India among the top industrialized nations in the world.

NEGLECT OF BASIC SCIENCES

However, in the process, basic sciences have suffered some neglect. Admittedly and for good reason, the emphasis has been on those aspects of the sciences which have a direct bearing on technology. India in its national laboratories has pioneered science relating to textiles, paints, metals, glass, electronic and electrochemical products, drugs, etc. But those branches of science which have no immediate or clear application or possibilities of application have received little prominence or support at the hands of Government. It has been acknowledged that today in India there is a sharp polarization of scientific research

in that while industrial research and such scientific research that has possible applications to industry are done in the national laboratories of the CSIR and other agencies, basic research with no immediate possibilities of application is relegated to the universities in the country. This is *per se* not an undesirable situation, and prevails in several advanced countries, where eminent scholars in science work in the universities. Indeed, the large majority of Nobel Prizes in the sciences have gone to university scientists. The universities are recognised as centers of learning where the human mind is encouraged to the acquisition of genuine natural knowledge regardless of its applications. On the other hand, the manipulation of knowledge and the phenomena of the real world for the sake of man is the function of technology and an appreciation of these roles of science and of technology is the foundation on which modernity is built in these advanced countries.

In India, however, this appreciation is lacking and in our enthusiasm to technologically advance the country we have permitted the sciences to suffer neglect. Indeed it is our view that while the lumping together of science and technology has been of considerable benefit to the latter, science itself has suffered. The CSIR does very little basic science outside the scope of industrial application, and the support provided for basic sciences under governmental auspices is negligible. The plea that a 'backward' country like India needs to ensure a decent standard of living for its people, that food, clothing, shelter, health and education are priorities in any scheme of development, is admitted. But India is backward perhaps in the economic field. It is not backward in its science development. How do we reconcile the presence of a very large number of competent scientists in a milieu of poverty and deprived surroundings?

UNIVERSITIES AND SCIENCE

One does not need to be reminded that the structure, organization and administration of the universities in this country, by and large, are hardly conducive for the development of learning, let alone scientific learning. Thoroughly indigent, ridden by parochial, state problems and pulls, governed by unimaginative rules and tenets, too numerous and diffuse, the universities can lay no claim to be temples of learning or venues for the acquisition of natural knowledge. To relegate

science and scientific research to such institutions is to stifle all initiative and make science a lifeless drudgery with neither content nor meaning.

SCIENCE AS A CAREER

But more importantly, science in India is not a career and does not provide one. It is tragic that a large number of 'Science Talent Scholars' end up, not as dedicated scientists working in the laboratories of the country advancing the frontiers of scientific knowledge, but as officers in the administrative or police service, or in the banking establishments. It is not uncommon to see science students willing and ready to pay huge capitation fees to secure admission to medical, engineering and technological institutions rather than choose a career in science. It is a truism that only those young people who do not secure admissions in technical institutions opt for science. Medicine, Engineering, Agriculture are career-oriented disciplines and one does not wish to blame young people if their priorities do not include science. Science in this country is neither a calling nor a means of livelihood.

We therefore need to take a close look at the sciences and ensure for them a place not only of honour but also a career-providing opportunity. It seems the time has come for Government to acknowledge the place of basic sciences in the growth of our nation and recognize its innovative role in technological advancement as a symbiotic relationship enriching each other but distinct from one another. The concept that support provided for technological or industrial research automatically encourages advancement of scientific knowledge is manifestly incorrect. Technology unrelated to science makes for craftsmanship. Creativity comes from science. If we may draw an analogy from Indian music, technology is virtuosity, mastery of technique, facility of expression and precision of construction. Science is something else, it is creativity, the unexpected flash of genius. Creativity, (Pratibha) and Virtuosity (*Sādhanā*) must go together. Both are needed to make a

musician. The latter alone—craftsmanship or virtuosity—fails to impress in the absence of innovative creativity. Creativity comes from the mind. Virtuosity is a matter of *Abhyāsa*, an effort of the finger or the larynx. It makes for expert music, not necessarily a pleasing one.

SCIENCE AS CULTURAL COMPONENT

Also, science is an essential component of culture. It is a means of perception of nature, of the world and of the universe. Scientific training sharpens one's perception enabling one to see connections where none was available before, to see the universe more or less as a totality rather than as fragments. To be sure, fragmentation remains but the process of proceeding towards a holistic perception is the flow of science. In this sense, science enriches life, adds to its quality and advances towards efficient, effective and orderly functioning.

It was reported the other day that the reconstituted NCST would direct its attention to rural priorities, to make the rural areas and rural populations in our country adopt scientific methods, practices and modes of life and to provide our villages the amenities they have lacked and which we pledged to provide at the time of attaining independence. These are unexceptionable objectives and the Chairman and members of the NCST can be expected to fulfil these objectives if resources are made available. At the same time, it should be ensured that basic sciences are not lost sight of. Whether by suitably orienting its policies or calling on the University Grants Commission or the Science Academies, the NCST should quite quickly convince the very large number of working scientists in the country that scientific research for its own sake is an endeavour which will not lack support from Government.

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