

Working scientists – Who cares

This refers to the editorial 'Ageing scientists' (P. Balaram, *Curr. Sci.*, 1999, 76, 463–464). It was rightly emphasized that senior scientists and academicians contribute very little to teaching or research activities. The sole criterion of seniority for managerial posts in the scientific department is detrimental to nation building and scientific pursuit. A premier earth science organization, the Geological Survey of India, still follows the doctrine of destiny, first cum first served. A seniority list is drawn which indicates the date of birth and the date of joining of a scientist in the organization. It is the fundamental and divine document that determines the fate of the scientists. It does not matter whether a scientist had achieved any distinction or award. His destiny is well defined in the gradation list. The worker scientists

(Assistant Geologist, Geologist, etc.) are involved in field and laboratory studies. The others (Director, Deputy Director General, etc.) are engaged in administrative work and may be termed manager scientists. Manager scientists are not assigned independent or otherwise any scientific work whereas worker scientists are given yearly assignment. Worker scientists are supposed to submit a progress report for each field season. The manager scientists supervise the working scientists. This is the height of callousness and absurdity. Though the organization had been offered flexible compliment system (FCS), a time scale promotion scheme, in the early eighties, promotions for the working scientists are hard to come. This is because manager scientists preferred cadre review which has resulted

in unrest and intense frustration among the worker scientists. The management is moving ahead with a recent proposal of FCS to increase the age of superannuation to 62 years and recruitment at organizational level without any discussions with the worker scientists or their association. A comprehensive and rationale approach to all these problems is warranted at this juncture. Further, posts of manager scientists should not exceed 10% of working scientists. Constructive debate on the subject is solicited in the scientific community.

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Decline of science education

J. V. Narlikar in his article entitled 'No Fizz and Spark – Decline in Science Education' published in Times of India (6 May 1999, p. 10) has stated that 'today a student... goes by default to engineering, medicine or... commerce' in contrast to the scenario that existed in the fifties and sixties when many of our science laboratories, departments and universities were getting established. He says that the present trend of a sharp decline in numbers and standards of students opting for science at the undergraduate level will have its impact in about ten years from now, as is being felt to some extent already; science personnel of high calibre and experience to man our projects will be in short supply. In spite of burgeoning social problems like illiteracy, water shortage, child labour and many others, one has to maintain a healthy scientific establishment even to find solutions to these very problems. Another important reason that Narlikar puts forth for building up and maintaining our S & T infrastructure is for us to be economically independent lest we are caught napping in the face of unforeseen sanctions as we are experiencing currently.

Methodology of science teaching that encourages rote, ill-equipped teachers and labs, lack of inspirational and committed teachers, poorly written text-books, peer pressure to join lucrative courses are some of the causes that Narlikar has identified as the causes for the current sickness that has afflicted the science scenario: the glamour of science and a proper and correct image is just not getting projected by our institutions or the universities. This unfortunate trend can be reversed, in the opinion of Narlikar, if the society has a will to do so and creates an environment to cure the causes of the deeply entrenched malady. Prakash N. Gandhi's letter deals with this problem and details some steps that may make science career attractive to the young.

– Editors

In his article in the *Times of India*, 6 May 1999, J. V. Narlikar (JVN) has rightly deplored the decline on the part of student community in pursuing studies in the pure sciences which are essential for conducting fundamental research, the backbone of technology. The cause of this decline can be attributed to several factors such as employment potential for scientists in India, monetary reward available to career

scientists, social status, etc. as compared to that of engineers, doctors, chartered accountants and other recognized professions.

After India became independent, our government under the leadership of Jawaharlal Nehru set up a chain of major industries throughout the country, thereby opening up employment potential for engineers. As the growth of industry accelerated and spread to

medium and small-scale industry, it is not surprising that our educated youth are inclined to opt for engineering and technical studies in preference to pure sciences. The above trend is likely to continue.

Several other reasons for lack of enthusiasm on the part of our educated youth to opt for science education have been mentioned by JVN such as sub-standard quality of teaching and text-

books in science subjects, ill-equipped laboratories, craze for scoring high marks in examinations, etc.

In my opinion, in order to give an impetus to larger numbers of school and college students to join the science team, the following steps should be taken by the people and educational institutions concerned:

Parents can inculcate a scientific temper in growing boys and girls. The essence of scientific spirit is curiosity, and questioning of dogmas, superstitions, and explanations given about cause and effect. Responsible parents can impart this spirit to their children and encourage them to find out true facts. One way to do this is for parents to make available general knowledge books on science topics for reading in spare time. There is also good scope for carrying out simple but imaginative experiments at home that children will love doing. My brothers and I, in our boyhood days, used to experiment with hot-air balloons, convex lenses and prisms to focus sunlight and break up into spectrum, home-made pin-hole camera, horse-shoe magnet and iron filings, examining objects through a student microscope, growing salt and alum crystals in a beaker, and other science experiments. All that is needed is inexpensive equipment and encouragement from parents.

Although long retired, I still remember with excitement the science classes at Banaras in Central Hindu School on account of spell-binding experiments conducted by our science teacher in the lecture theatre to demonstrate principles of physics and chemistry. These demonstrations were given after thorough preparation and by the teacher himself. In addition, pupils were required to carry out practicals prescribed in fairly well-equipped school laboratories. As far as I know, the majority of schools these days do not carry out live demonstrations on this scale nor provide adequate facilities to pupils for laboratory work. As a result, attending science classes in schools tends to become a boring exercise.

In my opinion, what we need to do is on one hand to make concerted efforts to bring about significant improvement in the quality of teaching as determined by the ability of school teachers, nature of science curriculum, and method of teaching science (with greater stress on laboratory experiments) and on the other hand to introduce modernization and technical upgradation. With the tremendous progress made by information technology in recent times, many schools and colleges around the world are beginning to bring personal computers (PCs) into the classroom and use these as educational tools to enhance teaching. Computers will not, however, replace the teachers or dehumanize schools as some people fear. A PC can be a powerful teaching tool for teachers accustomed to the world of blackboard and chalk; it greatly stimulates pupil's interest in the subject through visual images and video clips. A further step is to link up PCs installed in several schools in the area, thereby saving on cost of software by sharing and maintaining uniform standards. The teachers of course will have to be trained how to integrate PC technology with conventional teaching.

- The usual role of a University is to offer degrees and post-graduate courses in different disciplines, leaving it to the entrant to choose a particular college to join. Whereas the University authorities cannot discriminate in favour of any particular discipline or college, the colleges themselves can adopt suitable strategies for attracting talented students. For example, if a college offering courses in physics and chemistry strives for excellence by having a faculty of brilliant professors, by setting up top-class laboratories and research facilities and by making every effort to find good placements for its graduates, then students are likely to prefer joining such a college. This shows that skill in 'marketing' is a factor even in the academic world.
- In Western countries, museums devoted to science and technology are regarded as an important medium of education for the public,

especially the youth. The contribution of science in the progress of civilization from Stone Age to Space Age has been most significant. The role of science museums is to inform and educate the public as to how this progress was achieved through discoveries and inventions made by dedicated scientists. Apart from educating, visits to museums inspire creative minds. India is far behind in investing in this area of education which can help in popularizing science and technology, thereby encouraging wider use of technology in all human activities.

Availability of good public library facilities to the educated section of society for increasing their knowledge of science-related subjects and new developments is essential. Libraries set up and maintained by universities and learned societies are not open to the public as a rule. While people may gain some random knowledge from reading occasional articles on science topics published by dailies and weeklies, only a library can store information methodically for reference purpose.

On this aspect, I would agree with JVN that due to various factors, engineering studies and professions are attracting far higher proportion of our youth. I, however, feel this situation can change significantly once industrialists in India decide to strengthen their R&D capability, as indeed they must if they are to withstand the stiff challenge of global competition. So far this has been badly neglected by most manufacturers. I can foresee a rising demand for scientists for employment in our leading industries – both private and public sector – to boost research activities for developing quality products. This in turn should put a higher premium on science education in our schools and colleges.

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