New initiatives for national S& T manpower development by CSIR

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Much has been talked about the decline in trend of interest in science in our country. This is apparent not only in doctoral and post-doctoral research but also extends to the graduate and post-graduate courses in science. Evidently, career in science does not seem to hold fascination of fresh graduates and post-graduates. Thus the first step to create scientific temper among the youth would be to create a belief in the value of science. From here we can take them further to create an interest so profound that they choose to take up science as a vocation. In an attempt to achieve this, CSIR has taken initiative by starting new schemes for attracting students towards science.

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Introduction

It cannot be denied that improving the quality of R & D in science and technology and its optimum exploitation will go a long way in deciding the future of the nation. Although significant contributions have been made but the rate and direction of progress in S&T is not as it should be. One of the reasons for this could be that we have not been able to identify, motivate, and attract the talented to pursue science and take up scientific research as a career.

A study conducted for a period of 1989-96 indicates that there is a declining trend in the interest of school students and fresh graduates for different areas of science and technology1 (S&T). This is visible in the form of bright students opting for engineering and medical sciences at undergraduate level. It is seen that percentage of students opting for BSc in pure sciences has decreased to 15 from 32 per cent2. Also, this effect of decreased S&T output is observed in the form of reduction in the number of S&T publications from the country. For a developing country like India, which boasts of having one of the largest number of S&T personnel in the world the fall in the quantum of both science education and scientific research is alarming.

The identification of the problem has generated following questions: How can this trend be arrested? How to raise the overall standard of scientific R & D in the country? This problem is not only confined to India but is a global phenomenon, as seen from the recent studies3. The study shows that for the health of any organization (especially R & D) – there is a need to include and encourage younger and more entrepreneurial researchers in the system.

Towards attaining this the Prime Minister of our country has released a ‘New Science and Technology Policy 2003’. The objective of the policy is to recognize the changing context of scientific enterprise and meet present national needs in new era of globalization. One of the crucial objective of the policy is to attract the brightest young persons to the career in S&T by conveying a sense of excitement4.

CSIR being one of the premier R & D organization in India has been playing a pioneering role in national S&T manpower development through its Human Resource Development Group (HRDG). For last few decades, HRDG is supporting extra mural research programmes through schemes like Junior and Senior Research Fellowships (JRF, SRF), Research Associateships (RA) for pursuing doctoral and post-doctoral research, and also Research scheme grants and many others. Till date, CSIR has supported more than 50,000 JRFs, SRFs, and RAs.

The arrest in declining trend cannot be achieved by exclusive focus on science education and training at the higher research levels. Efforts need to be directed at the grass roots, i.e., schools and colleges also. The HRD group has risen to the challenge of promotion of S&T in the country by starting new programmes in the recent past and its schemes now cater to people from the age group of 16 - 65. The new schemes are:

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(i.) CPYLS (CSIR Programme on Youth for Leadership in Science).

(ii.) SPM (Shyama Prasad Mukherjee Fellowship).

(iii.) Entrepreneurship support to Research scholars.

(iv.) Fellowship in trans-disciplinary areas.

(v.) Faculty training and motivation and adoption of schools and colleges by CSIR laboratories.

(i) CSIR Programme on Youth for Leadership in Science (CPYLS)

In a recent study, the option exercised by students at 10+2 level was examined for science subjects for the period 1992-2002. It was found that till 1999, students preferred other subjects like Economics, Accounts, etc. to science. But the trend started changing since then towards science.

The CPYLS scheme for catching them young was initiated in 1999 with the objective to attract the meritorious school students (secondary and tertiary level) towards science and help them in building scientific temper at an early age and expose the young minds to exciting world of science.

Every year, top 50 students at secondary school examination (X class) from CBSE, ICSE and state boards are invited to visit CSIR laboratory for two open days along with one of their guardians. The aim is to let the young minds feel the thrill and excitement of science by seeing the scientists at work and the type of research activities being carried out. The scheme has an interesting element of these students spending up to 14 weeks in doing research project with an eminent scientist in a CSIR lab as they work towards their BSc. The focus on school children is a long-term effort to nurture a scientific temper which will hopefully translate into better and more focused research at higher levels. Till now, around 4000 students have participated in the CPYLS programme.

(ii) Shyama Prasad Mukherjee Fellowship (SPMF)

The Shyama Prasad Mukherjee fellowship has been constituted by the CSIR from the year 2001. It is open to selective (top 20 per cent) CSIR-UGC NET awardees of both the NET tests held in previous calendar year. They are selected on the basis of a specially designed screening test held once a year. It tests the research aptitude of students in—whether they are motivated and have passion for science. From the year 2003 onwards, this fellowship is also open to the candidate having a valid GATE score of 99 percentile or above. The fellowship offered to the recipient of SPM fellowship is very attractive and can easily match the starting salary of a fresh engineering graduate.

The objective of the fellowship is to nurture budding scientific talent towards pursuit of scientific research and pursuing PhD programmes with special fellowship in National R & D labs, R & D institutions, and universities.

Very high standards are set up for the selection, which are made through a specially designed written test followed by an interview. The written examination is designed so as to test candidate’s ability to analyze situations, comprehension, rational thinking, innovativeness, creativity, and model building capabilities. Only those candidates who clear this test are interviewed by a committee of experts. The entire selection procedure is completed in two days and the results are declared on the spot.

With three SPM examinations so far, around 1000 NET toppers have appeared for the test. Among them, 82 had been interviewed and 16 candidates were offered the fellowship. The point to be noted is, out of the ten candidates selected through the first and second examination, eight have joined in institutions of higher learning like: Tata Institute of Fundamental Research (TIFR), Mumbai—2; Indian Institute of Technology (IIT), Kanpur—2; International Centre for Genetic Engineering and Biotechnology (ICGEB), New Delhi—2; Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bangalore—1; and Indian Institute of Technology (IIT), Delhi—1.

(iii) Entrepreneurship Training to Research Scholars

One of the factors for decline in interest in pursuing a career in science has been attributed to economic reasons. Keeping in view the existing job scenario in the country, CSIR is initiating this scheme, whereby research scholars, at various levels would be trained in entrepreneurship as well as a spirit of intrapreneurship. It has been felt that the fresh PhDs coming out of the universities do not feel comfortable with private R & D institutions. Many of them invariably seek employment with government R & D institutions. CSIR through this programme will train them according to the needs of private R & D organizations. This training is expected to enthuse the participants to look at the knowledge-based technology entrepreneurship as a possible career option sometime during their careers, after gaining some experience in industry. These scientists are expected to work like
catalysts for wealth creation through industrial development.

(iv) Fellowship in Trans-disciplinary Areas

In present times, in new and unique research areas like bioinformatics, biotechnology, new drug molecules from herbal and traditional sources, new strategic material for space application, and natural disaster management, there is a need for manpower trained in overlapping fields of science which need not be traditionally coupled together, e.g. Biology + Information sciences (Bioinformatics). The effort will be to deliberately support researchers to face up the challenges of future rather than be confined to areas where there are limited opportunities and challenges. Through this fellowship, students will be encouraged to register themselves for Ph D work on cutting edge, interdisciplinary projects.

(v) Faculty Training and Motivation and Adoption of Schools and Colleges by CSIR Labs

In order to promote interest, excitement and excellence in science education at schools and under-graduate levels, each CSIR lab. will adopt at least one school and one college in its sphere of influence. The laboratory will offer not only facilities for project work and experimentation but also carry out student guidance and motivational programmes. This new scheme is an endeavour to take up training and motivation programme for selected science teachers to be the ‘fountain heads’ and ‘centres of excellence’ in science education in schools and under-graduate education.

Discussion

The percentage of students opting out from science during under graduation is very high at an average of 45 per cent. It is probably due to pursuit of professional courses. Also there is a marked shift in the quality of students taking to science stream. This is evident from comparatively low percentage of marks required for admission to science stream as compared to other streams. The need of the hour therefore is to make career in science more attractive in terms of status / pay structure / stability and career growth and

Fig 1— Trend in number of applications received for CSIR JRF-NET from 1998-2003
most importantly to overcome the challenges of providing job opportunity to aspiring young scientists.

However, we still have some ray of hope. A few determined scientists and institutions are making concerted effort towards making career in science more lucrative. This year the cut out percentage for admission to BSc. (Science) in Delhi University has gone up by 5 per cent, whereas arts and commerce stream have shown marginal increase. Similarly, when we go through the data of students applying for CSIR, JRF-NET, we find that there is a definite increase in the number of applications received since 1999, which showed minimum of applications received in the last 5 years (Figure 1). Does this reflect that some of the programmes started since 1999, like CPYLS and SPMF have started showing results? Perhaps, it is too early to predict.

Moreover, increasing opportunities are being created, by the entry of various multinational labs in the country. They are providing good placement opportunities for highly trained people in science. Thus the picture does not seem hazy and we can look forward to a generation of new enthusiasm in the youth towards scientific career in our country.

References