

## Science policy and scientific assessment

Ingenuity in science lies in (a) having a new idea, (b) developing a theoretical framework, (c) testing the mathematical theory, (d) planning an experiment, (e) developing a hypothesis/mechanism to explain the experimental features and (f) designing new experiments if necessary.

In the field of organic and inorganic chemistry, ideas and objectives are important. For synthesis, intuitive choice of route to synthesis, execution, characterization of products, test and assessment of objectives achieved are important.

Research in technology has to deal with (a) problems of advanced technology, (b) problems of indigenous technology and associated studies and (c) use of basic research for indigenous technology. The latter two are extremely important for a developing country like ours. Ideas come from accumulated knowledge obtained by theory and experiment. Theoretical and experimental studies in related areas of basic sciences are needed. Bench-scale experiments followed by pilot-plant studies and subsequent development at large scale are needed. Subsequently, problems arising out of development work have to be

given due attention. All these stages require skill and competence and should be recognized.

Unfortunately, in our country, originality and ingenuity is looked down upon in comparison to borrowed ideas. Borrowed approach leads to execution of multiplicity of experiments, borrowed interpretation and treatment of data mainly supporting the earlier findings. Similarly, in theory, parallel theoretical methodology and computations using borrowed programmes are used. The paradox is that such an approach is favoured by larger component of funding. Those who have adequate support for imported equipments look down upon those who are not so privileged.

Self-reliance is absolutely necessary for a country like ours. Originality, scientific temper and critical attitude would play a critical role in this process. This will play an important role in administration at all levels and management of the affairs of our country.

The qualities which are needed for developing sound scientific programmes and sound technology base are: (a) capacity to scrutinize observations and

detect particularly unusual ones, (b) intuitive ideas regarding the importance of novel observations, (c) capability to plan investigations to make use of the observation, (d) capability to design and develop appropriate experiments, (e) capability to interpret data/results in depth, (f) capability to develop suitable theoretical framework for having a deeper understanding of the observations, and (g) foresight regarding practical applications.

All the above qualities cannot necessarily be found in one person. But there are individuals who have one or the other specific quality. Each type is a valuable asset for any developing country, and should be recognized and respected. Scientific leaders who can coordinate and harness their talent are needed at this critical juncture.

R. P. RASTOGI

295/281, KA, Asherabad,  
Lucknow 226 003, India  
e-mail: rprastogi@yahoo.com

## Higher education

The University Grants Commission's (UGC's) latest move for tenure-based contract appointment for better research and teaching has evoked, as expected, three kinds of response. First, whole-hearted support with additional stringent conditions by Gupta and Garg<sup>1</sup>; second, cautious and incremental approach for the new methodology by Balaram<sup>2</sup> and third, opposition to the concept in totality by teachers' associations on the grounds of academic and exploitation issues. However, no one has come forward in favour of the prevailing state of higher education in the country. This itself is testimony to the prevailing pathetic state of higher education system. Certainly, faculty are the most visible faces of the higher education structure, as they constitute a single major group, which is responsible for both research and teach-

ing. In addition to these responsibilities, faculty are involved in multifarious activities for running the system. The faculty are supported by a large group comprising those working in different capacities, i.e. from education secretaries to peons including vice-chancellors, directors, registrars, principals, managements of privately-run institutions and above all the UGC. It is, however, ironical that performance of the entire system is judged by performance of the faculty alone. A majority of the faculty have no say in running the system.

Education, higher or otherwise, particularly in post-independent India, is somehow treated as an experimental crucible in which alchemists, i.e. educational authorities are performing experiments hoping that the system will yield good output, by putting accelerators,

retardants, changing the reactants or altering several conceivable parameters. Yet, the inertia is gradually tightening its grip. The latest move is unlikely to give the desired result, simply because attention is centred only on one sector, i.e. the faculty. Had this been the solution, all privately managed educational institutions, barring a few, would have excelled in research and teaching. Surely, none of them are on par with IITs, AIIMS, IIMs or any other good government-owned institutions, despite their long standing in the field. Secondly, efficiency and responsiveness can be obtained from permanent faculty only, as temporary faculty would have no long-term stake and commitment in the system.

The charter of UGC entrusts it with a mandate to maintain quality of higher education and promote research activities

in academic institutions. The performance of UGC does not inspire confidence because of the way things have transpired, viz. endless relaxation in implementation of National Eligibility Test (NET) qualification for recruitments, its inability in implementing nation-wide minimum uniform syllabus, timely modifications of subject structures, poor implementation of vocational or professional courses, limited support for research, failure in timely release of committed grants for research and developmental activities, discrimination among colleges in matters of promotional avenue and research, etc. No doubt UGC cannot be blamed for every ill in higher education, because UGC does not have direct control over academic institutions. But it is also true that UGC has shown lack of will in implementation of

norms and directives. However, UGC always remained generous in recommending higher salary for faculty.

The proposed system of tenure-based contract appointments is guided by economic liberalization and globalization. This is unlikely to solve the problems that have crept in research and teaching. The knowledge and research competence of individuals is a matter of personal commitment and is acquired by sustained efforts of years of hard labour.

Instead of searching for short cuts, the time has come to tackle the problem in totality by directing equal attention to all components of higher education: first, by recruiting competent and committed faculty by a transparent mechanism, preferably on the pan-India basis along with creation of necessary facilities. Secondly, by removing discrimination between

college and university faculties. Thirdly, by strict enforcement of stated work norms with a system of performance-based incentives and lastly, the most important by selection of quality leadership, i.e. appointing vice-chancellors and principles who can provide the right atmosphere in the institutions.

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1. Gupta, B. M. and Garg, K. C., *Curr. Sci.*, 2002, **83**, 1431–1432.
  2. Balaram, P., *Curr. Sci.*, 2003, **84**, 5–6.
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A. K. BIYANI

*Department of Geology,  
D.B.S. College,  
Dehradun 248 001, India*

## Academic performance should govern open-ended salary of contractual appointments

There have been several letters expressing concern for declining standards of scientific research and teaching in India. It is well known that India is rated far behind China and many of the Asian countries, and its global ranking has fallen from 8 to 15 despite its status as the second most populous nation, as reported recently (*Science*, 15 October 2002). Scientific publishing in standard international journals has dropped by 24% since 1980. Many who take pains in writing such letters and putting forward their opinion wonder at times whether these comments often fall on deaf ears and do not reach scientific managers and planners. The recent news of bringing in contractual appointments in scientific teaching and research has clearly shown that the governing system in the country does not sit idle, despite the fact that at times they have to counter bitter opposition. Recently, *Current Science*<sup>1</sup> has also welcomed the move and has wished for its effective implementation.

When it comes to implementing contractual appointments in India, it is desirable that the details of the systems operating in some of the foreign countries should be studied in detail. The

ideas and steps have to be modified to suit Indian conditions. The educational system in India is not able to attract meritorious students to teaching and research. All those who venture to opt for such jobs, soon get frustrated because of lack of incentive, appreciation and any financial benefit. Many of them who are capable of doing much better in academic pursuit slowly get frustrated and stop spending their valuable time in teaching and research. Indian libraries are a victim of enhancing costs of scientific journals followed by enlarging list of new journals. The news regarding the government's decision to start contractual appointment is recent; we do not know of even the initial response of the academic system. It is obvious that under the prevailing conditions in the country, very few working universities and research institutes would appreciate having colleagues in the same department with different designations, and drawing better salary and availing better facilities. It has to be made foolproof in the form of a well thought out contractual agreement for their faculty or new appointees. All those who meet the requirements should be given contractual appointments for the

sake of boosting the sagging morale of those dedicated to academic pursuit in general. Very few faculty members who have surrendered to easy life and comfort can venture to take up such a challenge. Such a system would attract and motivate the younger generation. The deemed contractual system is meant to make them more conscious to deliver their best and bring out their talent. If the proposed change is properly implemented and buildup, many of our younger talents working abroad would think of returning and serving their own country.

In the foregoing discussions, emphasis has been on our talented younger generation. However, the system should not ignore the senior scientists who have battled against all odds in keeping the scientific pursuit alive. They should also be given similar opportunity for pursuing their fields of research. The scientific system should be above any considerations other than academic pursuit and delivery of desired output on par with international standards. It is perhaps the right time to go out and pick up some more young scientists and engineers serving outside the country. This is precisely what was done by late Pandit