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EDITORIAL

Judging Academics

Evaluating the work of researchers and teachers is not an easy task. It is probably easier to assess the performance of investment bankers and marketing managers, although I suspect there are many other professions where evaluation may be a difficult exercise. Academic institutions, universities and research laboratories need to periodically assess performance of individuals and departments, if improvements are to be effected. In these days of 'world rankings', Indian institutions cannot afford to be totally left out or appear to slide down the charts in the face of global competition. Assessments, evaluations and the rate of success of new recruits, both faculty and students, in establishing themselves in productive niches, are therefore legitimate concerns of those responsible for administering academic institutions. I was therefore very attentive when a young, ambitious and articulate colleague argued that the emphasis on research publications, as an index of academic success, was misplaced. He advanced the view that it was important to also consider the contributions that individuals (and, by implication, institutions) make to 'human resource development (HRD)'. My interrogator asked me pointedly: 'Do you consider the creation of human resource as an important parameter in the academic assessment of faculty?' I have never been comfortable with the abbreviation HRD or its expansion; this is a phrase that has replaced a simple word, that was common in simpler times – 'education'. However, both government and the corporate world believe that it is an apt descriptor for activities, which train people to be usefully and productively employed. HR (human resource) managers seem to be important functionaries in every major corporation, but are unknown in academia. In thinking about my colleague's poser, I came to the conclusion that he was referring to teaching in all its forms; in the conventional classroom, as well as in the laboratories, where students learn the practice of research. A few days later, I was in the audience when C. N. R. Rao, one of our most illustrious scientists, reflected on a long and unmatched career. In concluding a forceful and exuberant presentation, he exhorted the young and aspiring researchers, who had assembled in large numbers, to be 'unafraid of publishing'. His argument was compelling; quality and quantity of academic output must go hand in hand if Indian research was to keep pace with the increasingly competitive world of global science. This was a message which seemed to be clear and unambiguous; one which I could confidently endorse, both as a scientist and as an administrator. But, listening, as I have been to divergent views, two questions seemed to loom large. First, what does it take to be 'successful' in science? Second, how can institutions judge the performance of researchers and teachers?

A career in academia can be most enjoyable and fulfilling, low salaries notwithstanding. Academic scientists choose their own problems and follow their own inclinations, jealously guarding their freedom and independence. But academic careers can follow a treacherous path, especially in the early years. A Ph D is the passport to a life in research. Choosing disciplines and mentors ('guides', a term which somehow always reminds me of R. K. Narayan's famous novel) can be decisive in shaping careers. The craft of research is best learnt by apprenticeship. The ability, to make judgements about scientific problems and approaches to studying them, is effectively acquired by closely watching the more experienced and successful practitioners of the craft. The postdoctoral period allows a glimpse of the increasingly common world of team effort; it is a time when the skills of collaboration are often learnt. The hardest period is undoubtedly at the start of an independent career, when problems have to be chosen and the difficult lessons of mentoring have to be mastered. In most fields, new faculty members at any of India's major institutions are able to quickly attract students willing to register for research degrees. The immediate task then is to choose the right research problems to address. This is often difficult for young researchers returning to India after long stints in large groups in Western laboratories, which function like well-oiled research machines. Imported problems rarely take deep root in local soil. The absence of technical support to operate and maintain sophisticated equipment is a sudden impediment that confronts researchers, who are used to efficiently run 'core facilities'. In fields like biology and chemistry, the need to routinely use expensive and complex equipment is acutely felt; technical innocence can be a crippling handicap. For the 'inbred' researcher, in our institutions (and inbreeding is a common practice) there is a regrettable tendency to continue with problems and areas investigated for a doctoral thesis. Succumbing to this temptation is clearly an invitation to bury a research career even before it has begun. Choosing a problem that is topical and addressable is a challenge that must be faced. Reading the literature, listening (and listening carefully) to seminars

and taking an interest in problems being tackled in the surroundings is a pragmatic way of feeling one's way through new areas of research. Chasing after ever changing fashions in research can turn out to be an unrewarding exercise, in the Indian environment. Peter Medawar in *Advice to a Young Scientist* (Harper and Row, New York, 1979) offers a cautionary note: 'It is one thing to fall into step with a great concerted movement of thought such as molecular genetics or cellular immunology, but quite another to fall in with prevailing fashion, for say, some new histochemical procedure or technical gimmick' (p. 15).

How long must research problems be pursued if no results of note are forthcoming? This is a question which is difficult to answer in a precise fashion. The history of science is replete with examples where great success has been achieved after a long period of drought. Relentless pursuit of a problem by an obsessed and determined researcher can yield a solution after considerable periods of time. But, in today's world there is little sympathy for long, unproductive periods in a researcher's life. Results, publishable and visible, are important. It is therefore critical for researchers, especially in the early phases of their careers, to judge how long they will plough an unyielding field. Most often, it is intellectually satisfying to pursue what is sometimes called 'hypothesis-driven research', as opposed to the simple minded approach to science, which Ernest Rutherford famously labelled as 'stamp collecting'. It is not uncommon to see researchers driving their students to find experimental support for a pet hypothesis. When this is not forthcoming a very difficult situation can develop; many mentor–student relationships have floundered when pet hypotheses resist experimental verification. Medawar proffers sage counsel: 'I cannot give any scientist of any age better advice than this: the intensity of conviction that a hypothesis is true has no bearing on whether it is true or not' (p. 39). The irrational desire to provide an experimental test of a flawed hypothesis can be dangerous; overly optimistic interpretations of results can lead to researchers deceiving themselves. Medawar has a sombre thought: 'A scientist who habitually deceives himself is well on the way toward deceiving others' (p. 39).

For researchers at the start of an independent career, there is a sudden transformation in role; the apprentice is expected to blossom into a teacher. The twin responsibilities of classroom teaching and mentoring students in laboratories can seem formidable in the early years. Teachers acquire a degree of competence in classroom lecturing, with practice. Building a viable research group is a key ingredient for success in most areas of science. There are very few research problems today that can be successfully tackled by lone researcher. The difficulties of group activities quickly become apparent, as individuals vary greatly in their personality traits, their intellectual and experimental abilities and in their commitment to work. Students (and senior researchers) can be energetic and aggressive, passive and introverted, ambitious and cunning, enthusiastic and childish. The selection procedures at the best of our institutions are intended to ensure a basal level of academic ability. They rarely test motivation and commitment. The task before institutions and mentors is to mould the new entrants into competent and productive researchers. It is this activity that my colleague seemed to be referring to when he used the term 'development of human resources'. Most young members of the faculty develop passable skills at mentoring, but few will disagree that mentoring can, at times, be a difficult task. The pressures of research and the drive to be successful can often make senior researchers view students as a 'resource', with which their personal career goals are advanced. In these situations the student can acquire a number of technical skills, but may be slow to mature into an independent scientist, with a broad view of the discipline. Mentoring, like parenting, can be both pleasurable and stressful. Patience and good humour are characteristics of successful mentors. The best teachers are those who like to have students around them always; age is never a barrier in this relationship. Teachers can be intellectually refreshed as each new generation of students stimulates a renewal of the mentor's commitment to scientific research. The inability to act as a mentor can destroy scientific careers, as research productivity, most often, depends on the work of students. There is one important difference between conventional teaching and mentoring in a research environment. The damage that can be done by a poor lecturer in the classroom is limited. Far greater damage can be inflicted in a research laboratory.

I must return to my original concerns. Are publications the only parameter for assessing faculty performance in our research institutions? I cannot really think of a simpler and more reliable metric of measuring scientific output. Assessments of what constitutes acceptable quantity and quality necessarily vary across fields. Comparisons are always more reliable when restricted to well defined areas. We must also remember that Ph D research that does not eventually get published, makes most serious academics uncomfortable. For work from India to have significant impact and to be noticed, both quality and quantity are essential. Mentoring is another activity that merits credit. The primary purpose of research institutions is to provide a launching pad for academic research and to produce successive generations of trained researchers. In emphasizing the role of 'creative mentoring', the journal *Nature* has introduced a new award, 'created on the premise that the mentorship of young researchers – although fully deserving of recognition – is perhaps the least remarked on of all the activities that take place in the lab' (Lee, A., Dennis, C. and Campbell, P., *Nature*, 2007, **447**, 791). After a survey of the attributes of good mentors, the authors conclude: 'Having a good mentor early in one's career can mean the difference between success and failure in any career'. Even more importantly, they note: 'Those who are good mentors get incalculably more out of it than they put into it'.

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