

The question of post-doctoral fellowships: A feasible case for apprenticeship in university teaching

V. Sitaramam

Among the organizations like CSIR, DST, DBT, etc., a few crores are designated for post-doctoral fellowships. The question of how effective these programmes are looms largely on the grant-giving bodies, at least when the advisory committees meet. Inter-linked is the question of CSIR-UGC NET wherein there is an acute mismatch: those who want it badly hardly get through and of those who qualify, many opt out. The state level exam, the SET, has hardly changed the picture at least in Maharashtra because the standards can be either lowered or not. The missing link appears to be the changing scene on the sociology of science education in the country: are those with primary career options in science totally replaced by drifters or have the opportunities dried up? The scenario needs to be examined looking for fresh options. The key issue seems to be the role of 'contact teaching' at the University level, not so much for the sake of students alone but for improving the process of education as well as research.

The problem statement and the solution are very straightforward. Many get their Ph D degrees. Not all find an immediate placement. For many, a change in place and area are useful. So let us support post-doctoral positions wherever possible. Something good will come out of that. Except, we have been doing this for 2-3 decades. Is everything okay?

The statistics can be had, simply for asking, from the grant-giving agencies: how many and how long. The statistics tell us little when it comes to any performance yardsticks. There are hardly any yardsticks, only apologies. The post-doctoral programmes on the research front are said to be simply not working, generally speaking (note 1). There is an intrinsic fallacy with summary statements of this kind. These represent as much lack of insight as the blind continuation of programmes do in the absence of introspection.

We have been facing the question of the role of post-doctoral programmes in our own department. This resulted in a series of changes by a combination of hardhat approaches and plain cajoling, leading to prospects and possibilities that we originally did not envisage and hence this attempt to give the information.

The post-doctoral fellows' views on their situation

Whenever we talk about the post-doctoral positions and their worth, the reaction of the post-docs *per se* is one of extreme defence. It takes phenomenal amount of persuasion to get them to talk collectively on the generality of post-doctoral positions. The immediate and most common

responses are: 'If faculty cannot get research out of us, there must be something wrong with the faculty'; 'Who is publishing any way?'; 'The areas of interest are limited and my particular speciality does not get represented in the research scheme'; 'The fellowship is not adequate' (till the revised scales are implemented, then the argument shifts to increments); 'There is no future' (jobs, that is).

Table 1 represents a SWOT analysis as perceived and given by our post-docs. These have done their Ph Ds in national laboratories, universities, industries and professional (deemed) universities. The minimum period is 1.5 years and the maximum is about 6 + years. An analysis of information available of placements is given in Table 2 of the past post-docs with us. Clearly, availability of research associate (RA) positions is an important requirement for a third or more of the RAs for their subsequent placements.

Some background explanation is necessary to understand the change over the years in the management of post-docs in our department. To begin with, DBT has given us positions for RAs, which were used as conventional post-docs in the combined department of zoology/biotechnology. The RAs were assigned to faculty for research purposes, and they would also chip into some teaching when required. With the separation of the new biotechnology department, and with delays in faculty recruitment, as well as due to a significant utilization of the teaching manpower available in the city for specific courses, a conscious decision was made to assign teaching to the associates commensurate with the responsibilities at a lecturer level. Clearly, all of them

would qualify, at least on paper, for a lecturer position in the university. Since the positions are temporary, experimentation is possible. A major emphasis on practical-oriented teaching, as it was always practised in our programme at Pune, could be continued only due to the participation of these teaching associates, in the face of severe limitation of the faculty strength. Yet no criteria existed to evaluate their performance. The title of a RA created some conflict because they spend good time in teaching and fulfil an important function. Yet, when it came to their evaluation, this accountable use of manpower is lost in committees that are geared only to the assessment of the so-called RAs. A major worry for the post-docs is that the negative remarks made and the money spent on post-doc programmes elsewhere in an apparently unsatisfactory manner should not reflect on genuine attempts at performance of the teaching post-docs, intrinsic or imposed.

At the completion of every year, each associate is reviewed for continuation, individually as well as in terms of collective performance. Tables 3 and 4 represent the current performance of a sample of four such associates, given by the associates themselves. Those that were well below this level of performance either resigned or were discontinued by the review committee. Apprehensions of arbitrariness were minimized at least among those who stayed back.

Development of post-doctoral training in teaching programmes

While it is premature to talk about any quantitation of the means and efforts in

Table 1. SWOT analysis of and by University-placed post-docs with teaching responsibilities

Strength	Weakness	Opportunity	Threat
1. Placement with faculty with experience in teaching and research.	1. Lack of job offers bleak prospects for future and therefore enthusiasm suffers.	1. Limitation of staff forces one to learn management of departments in terms of procedures, purchases, lab maintenance, besides research and teaching.	1. Last preference for post-docs in the absence of any job linkages.
2. Hands on training in teaching and management in teaching.	2. Teaching reduces job prospects in future jobs which are research-based.	2. Course coordination with contributory teachers and monitoring the topics taught gives an overview capability of areas and skills to audit syllabus completion towards specific objectives.	2. Since the job is titled RA, teaching is not given weightage in evaluating performance.
3. Accountability in terms of work in a structured way possible.	3. Small departments do not offer enough faculty strength for varied interactions.	3. Practical preparations permit design of teaching aids using the available equipments and methodologies.	3. No specific criteria exist even for pure RAs for assessment.
4. Broader experience with subjects, methodologies and equipment not possible earlier.	4. Lack of contingency money diminishes the academic freedom for work.	4. Presence of other post-docs helps some discussions without hindrance on teaching and management problems.	4. Age bar for industrial appointments and elsewhere hampers mobility.
5. Limited activity matches life style requirements for those catching up with personal requirements.			

Table 2. Placement of past post-docs from the department

Current position	Number	Percentage
Jobs	6	39
Independently employed	2	12
Continuing as RAs elsewhere	5	31
Not employed (housewives)	3	18

such a programme, some trends are clear. The evolution of a post-doc follows the same pattern of a research student as outlined earlier (Sitaramam, V., *Curr. Sci.*, 1995, **68**, 779–782). Their skills in teaching are marginal and management even worse and they improve with time almost without knowing why or how. The resentment initially could be higher because the post-docs seriously believe (at least initially) that most preparations for teaching are below their dignity. Ordering chemicals, looking after equipment, answering questions and vice versa with students are all thought of as inferior activities. The worship of ‘pure’ research positions and class distinctions between universities and research labs is carefully nurtured among students and post-docs and this is a major source of heartburn for the new entries. The defeatist position expands to a level that they even seriously wonder whether they are bad role models to students (because they are in the least enviable position and they may wrongly influence the students). In the absence of some future for these transitory positions, this negative image is

likely to persist. On the other hand, neither the students nor the post-docs yet perceive what difference it makes to have half a dozen transitory post-docs in the training programme in terms of sheer contact. The innovativeness in practicals, examinations, supplementary reading materials, discussions, all of these activities so essential for a sustained pressure in professional teaching could improve only with larger number of research fellows and post-docs. This is hardly realized and made use of.

In a span of one year, the mechanics of teaching and arrangements become very familiar to post-docs. With the introduction of computerization of many aspects of administration (few post-docs currently are computer savvy), the drudgery decreases and efficiency increases. The mood does not change much due to a difficult and ill-examined value system.

The place of research among the associates

When post-docs are taken in research schemes, the situation is clear in terms of

the work that needs to be undertaken by a person. By no means is this clarity matched by performance. It is difficult to find tailor-made fellows for any project. Those that join may not have the background. Those that may have the background may not have the inclination.

In spite of the large turnover (note 2), our experience has not been bad. Some important publications could arise out of the work in which the post-docs participated. The most ideal situation was when the post-docs and research students could directly interact over the research problems. Entirely new programmes and ideas could be generated, however rare.

The problem is more difficult in general teaching positions. Indian doctoral training does not teach accountability (note 3). The post-docs we get are of three kinds. Majority are those who are in Pune because of their spouses and other family reasons. The second are those who are waiting for a post-doctoral placement abroad. The third are those who cannot get a position anywhere else. The best aspect we see in many of them is that they are invariably of a very decent kind in a ‘live and let live’ sort of way. Even if left entirely to themselves, they will come to the department sometime during the day everyday. They prefer conducting practicals to lectures, since they feel insecure in serious teaching. They do feel concerned in a vague sort of way how their research performance is going down because of the teaching requirements

(note 4). In a university environment, where the faculty come in and go as they please, and where much research does not go on any way except for the occasional strange anti-social beings, they strongly feel that they should not be harassed about working hours or productivity. What makes them exceptional human beings is that when such rules are imposed, they do understand the value system and do not carry too great a resentment.

Very curious views exist about research. Nearly every one has three standard approaches for suggestions. One relates to his/her immediate past work, usually Ph D level. The second relates to 'developmental plans' including cell lines, hybridomas, cDNA libraries with the claim that these can be exploited in future for teaching, research, cell repositories and industrial purposes (note 5). The third relates to going out of the department to work elsewhere to develop work of his/her interest (note 6). Sticking to working hours like in a national laboratory is not acceptable because this is a teaching job, as if teaching cannot be done in regular hours. Working in defined areas of the faculty within the department is not acceptable because it conflicts with

the notion of academic freedom or one's own past training and interest (note 7). Can they work on their own? The atmosphere and teaching load prevent them from getting down to business, since one can always start after the present semester and when the exams are over. Strangely, the day does not arrive.

Out of what seems to be a dismal situation, the notion of a teaching associate arose and took root in the department. The idea of a teaching associate may be an excellent way to enhance the quantity (quality not ruled out) of teaching and we recommend a serious thought to this idea by those who wish to do something at the national level.

Teaching less than the best: The need of the hour

There is no bigger nonsense than to imagine our class rooms being filled with young, growing, inquisitive minds absorbing knowledge like sponges (note 8). The CSIR-UGC NET examination is a fairly good indicator of minimal standards acceptable. Since most departments cannot get any passes other than the occasional,

one imagines rightly that the occasional success is the exception than the rule.

That is not to say we do not have material for doing a lot of work. A lot of good biology requires very little prior capability (note 9). The students can be usefully classified as above 80-85%, below 80% and below 60%. The top students, generally a progressive rarity in sciences, fend for themselves and can interact and generally do well. They flourish in an environment of limited teaching and if forced, develop many skills on their own. The second category are where the better students now are. They can handle clear situations and, given a lot of effort and even plain screaming, can pick up a number of techniques and even a few ideas. The third category simply needs to be spoon-fed and periodically burped lest they should choke themselves with even moderate cramming! Nearly 50% of students in biotechnology and up to 80% + in other sciences are of this category now.

As options (individually as well as collectively) worsen for jobs, many gravitate towards research. Education, including Ph D, is a way to postpone the inevitable, the day of the job hunt. Since few candidates fail in their Ph D programmes due to conscientious guides that abound amidst us, many reappear as post-docs without a job, completing the circle. Therefore, 'we must fight fire with fire'. That is, these post-docs are ideal material to teach less than the best (note 10). That is the essence of contact teaching, which is required for less than the best. To reject contact teaching is to accept the 'under 60%' without question and without hope.

Training teachers: The role of university departments

A teaching department is generally starved for supporting staff, at least the working kind. Therefore the faculty look after a lot of things themselves (note 11). Therefore, unlike in a national laboratory, the

Table 3. Performance evaluation of teaching/research associates

Sr no.	Teaching assignment*		% (h) 1999, 1 half
	Theory**	Practicals***	
1	20	15	10 (105)
2	17	9	7 (78)
3	15	6	6 (63)
4	17	15	9 (96)

*3 h computed for each assignment, theory or practical. % refers to total load of the department, 300 lectures for six courses and 56 practicals of 3 h duration (may go up to 6 h in some cases) which makes up for one semester each for the first year and the second year; **3 theory courses of 50 lectures (1 h each) per batch per semester; ***2 practical courses per batch per semester. Counted twice if there is more than one batch of students.

Table 4. Associated departmental duties related to course coordination and examinations for one semester, (i.e. half year)

Sr. no.	Semester planning	Exam	Test	Lab maintenance*	Research	New techniques	New practicals	Total	% occupancy
1	2	2	1	3.5	2	3	3	13.5	73
2	2	2	1	2.5	2	1	3	12.5	67
3	2	2	1	3.5	0	0	3	11.5	51
4	2	2	1	2.0	0	0	2	9.5	51

Work load shown in weeks, at 6 days a week.

*Lab maintenance includes ordering, stock taking and meetings periodically for requirements. Each person coordinates 2 courses from inception to examination.

post-doc gets trained in a whole lot of activities like ordering chemicals, equipment, lab maintenance and other related matters. Chasing various teachers for lectures, demonstrations, arranging lectures, invited talks, matching the syllabus create a whole lot of activities that one normally does not encounter in lower levels of learning as in a Bachelor's degree. In other words, the post-docs get efficient in handling situations while they would be in absolute wilderness when they started. These skills are totally alien to their degree training. They are often left to their own devices since the faculty may or may not indulge their requirements or may not have ready answers. In other words, they experience responsibility for the first time in their lives and they have to look after themselves. That includes job anxiety and continuation.

Teachers in colleges have refresher courses and M Phil programmes for quality improvement. Neither address themselves to the basic requirement of running a science department which requires managerial skills in the face of limited help and options. The teaching/research associateship programme appears to offer exactly that. They have the students to support. Job satisfaction is assured and they have the more senior faculty to argue with when things are not going well. The programme has active science possible in it, by way of projects, etc. which is something they can chip in at their own pace. If you seriously consider all this, it beats any formal degree or diploma in education. This leads us to the idea that such a programme may be made available to freshly appointed lecturers as an apprenticeship phase before they start teaching science in colleges (note 12). M Sc is something that is totally dispensable if B Sc teaching is good. Since it is not, postgraduate degrees have come to stay. This induction of apprentice lecturers may help college education in the new millennium in the face of expanding technological base of relevance to science education. There are problems in arranging such deals but since this is an unanticipated solution to an existing problem, it is worth looking into.

The mainstream of education takes into account people and not subjects. Education of a liberal kind is the pipe dream of a bygone era (note 13). Whenever we have not taken into account the utility of a discipline and tried to build a

long-range perspective, those subjects have deteriorated (note 14). Much has been said about the low quality of Indian science. Much of science *anywhere* is of low quality (note 15). No other country has dissociated the mechanics of development of higher learning as much as we have. With our pious notions of only handling the best, we have thrown the baby with the bath water. What we have mostly are average people with average abilities or less. These go abroad and do well. The secret of American science is that it is university based and took care of the average requirements of science and technology very well. With our emphasis on catering to the best without the foggiest notion on how to get there (note 17), we act by self denial. Let us put to use what we have.

Notes

1. Research in USA is dominated by post-docs whom we supply in good measure; the same formula has not worked here. Research in this country is entirely by Ph D students.
2. Possibly because of this high turnover!
3. By accountability, I refer to the salary received, the time spent and the goals reached. It is amazing, and we absorb without complaint, that a post-doc can draw salary without contributing even a bit to the project that he/she had joined. It is equally amazing that post-docs expect that they need to be spoon-fed techniques in a new lab as a matter of right.
4. A teacher in the university must spend about 8–10 h of contact teaching per week. In a 14-week semester, with two semesters making up for a year, the obligatory participation does not exceed 250–280 man-hours. Considering a 7–8 h day a week and a minimum of 200 working days in a year, this amounts to some 1500 h, wherein obligatory teaching does not exceed one-sixth. So much for the nonsense that teaching interferes with research. The post-docs, if any, spend an equal amount of time. Organization is often blamed for non-performance. Self-organization rarely is.
5. A little difficult to argue against since even institutes have been started on such vague premises as many research projects. The situation is not too different from Project Advisory Committees, where we have droves of investigators wanting to assay either calcium levels (cAMP is now banal) or do apoptosis assays or better still, clone the ever-green genes.
6. We attempted placing post-docs to work even outside the four walls of the department and gave up when the person could not be even seen during the tenure with no record of what has been done!
7. More than 90% of post-docs who go abroad work in a different area. More than 80% who return speak of what a wonderful change it has made. The irony is that they wish to continue where they left off in their post-doc period. Where is the lesson learnt!
8. Whosoever said that is awfully confused between classrooms and MTV.
9. I was very confidently told, possibly very correctly, by some modern-day biologists that universities need to train students in some basic textbook stuff and that they can teach and train to perfection all the experimental techniques in 2–3 months once they have taken them as Ph D students. It takes us about 12–15 months before we can have a useful dialogue with a student in more old-fashioned disciplines.
10. Aren't we all! There is no patronizing involved in this statement of less than the best. Those are the facts that we never addressed ourselves to.
11. Thanks to the PCs, the typing and related chores have become marginal in terms of depending on others, at least for those who are physically active.
12. I can visualize a situation wherein a college administration enters into a contract with us for their new lecturers to be house-trained for a year or two before they begin to teach in their colleges.
13. Liberal education is all right to govern colonies. The responsibility stops when you pack up and take a ship home.
14. Much of humanities has gone this way since, as a nation, we have not become sensitive to issues and their handling.
15. We are unnecessarily romantic about the quality of science. Kuhnian science, professional by definition since it is normative, dominates among the practitioners. The overall quality can improve only when such professional science is respected. Ideational science is rare and better be so. Revolutions cannot happen as often as Indian elections!
16. Are we not tired of Bohrs and Curies abounding our science policy anecdotes and editorials? What is wrong with professional science anyway?

ACKNOWLEDGEMENTS. Many research associates, past and present, knowingly as well as unknowingly, contributed to much of what has been written here. The present lot have actually participated in a large number of discussions which formed the basis of this note.

V. Sitaramam is in the Dept. of Biotechnology, University of Pune, Pune 411 007, India. (e-mail: sitaram@unipune.ernet.in).