MASTER NEGATIVE NUMBER: 09296.34

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Quality of Research in Science.
Current Science, 76 (1999): 266-267.

Record no. D-98

Quality of research in science

The article entitled 'Let us do justice to science' (*Curr. Sci.*, 1998, **75**, 78–79) and the two subsequent elaborations (*Curr. Sci.*, 1998, **75**, 750; 979) bring to focus a number of serious problems leading to the questionable quality, in general, of research in India. Major among them are: (i) Poor quality of Ph D theses which include routine, repetitive and imitative research. (ii) Absence of discrimination between a good researcher, a good teacher and a good teacher-cum-researcher in career advancement. (iii) Contrived evaluation of Ph D thesis. (iv) Indiscriminate admission of candidates to Ph D, without adequate evaluation of research aptitude, in general.

However, a few institutions have mostly been successful in countering those problems. Consequently, not only the Ph D thesis of those institutions satisfy quality standards but quality papers from them get published in international journals also. The logical question that follows is: Why is it that such institutions are not replicated or other institutions improve themselves to such standards? As often happens, logical questions evade logical answers. However it would be introspective to analyse the existing situation.

I shall consider the research environment in agriculture. Not only public funded institutes but also universities are engaged in research and teaching. Such institutions, follow the pattern of land grant universities in USA for their Ph D programmes. All State Agricultural Universities (SAUs) and premier research institutes of the Indian Council of Agricultural Research (ICAR) which enjoy a deemed university status come under this category. An advisory committee is set up for each Ph D/M Sc student and the student has to complete a set of courses in tune with his field of research. Performance in the courses is evaluated through a set of examinations. The question papers are usually set by the course instructor(s) and a grade is awarded which carries a grade point. A student has to obtain a minimum grade point average (average of grade points weighted by the number of the credit hours per week of each course taken by the student) before he/she becomes eligible to proceed to work for his/her Ph D/M Sc thesis.

Conventional universities (to contrast them from Agricultural universities) which are governed by UGC regulations follow the British system. A student who gains admission to Ph D has no mandatory course work to do but can work for his thesis. In other words, the thesis provides total fulfilment of the requirements of a Ph D degree. In contrast, in the land grant system, Ph D thesis provides only a partial fulfilment.

Right from admission, the system comes under various constraints:

In many institutions, only those with B Sc (Agriculture) degree are eligible for admission to M Sc/Ph D. One argument is that universities offering Ph D under the British system do not take Agricultural graduates. Thus teaching and research are geared to the standards of B Sc (Ag) which vary widely across universities. In addition, in premier research institutes, there are various kinds of quota not coming totally under the rigours of admission criteria. However, admission is selective based on a competitive entrance and a oral examination mainly in premier research institutes, and varying standards exist across SAUs. Standards for research scientists to be eligible to become faculty members also vary across institutions. As has been repeatedly pointed out, the absence of weightage for career advancement for a good teacher and good teacher-cum-researcher continues to be a crucial dampener.

There are scientists who guide Ph D students; but it is not uncommon to find a few faculty members who do not teach any course. The thesis problem is selected around routine research tending to be lackadaisical in output. Naturally, academic excellence and originality in research remain to be conscientiously promoted.

While agriculture is a major sector of the country, job opportunities are grossly incommensurate with the number who

get Ph D every year. If we concede that the quality of Ph D remains often below par, it is rational to argue that, not all, need be taken into a research career. But then the evaluation system to screen those fit for a research career should be strong and stringent. Real merit and performance should be the sole criteria. Agriculture is a state subject. Implementation of a stringent common system of admission across SAUs remains still a distant option. Several, possibly valid, reasons exist, but it is high time that we see reason behind reasons to make the distant option an immediate reality.

The quality of research, as revealed, particularly, by a student's thesis is a function of student's aptitude and acumen which again is a basic function of the standards maintained in B Sc or/and M Sc, as the case may be.

Three major elements need immediate attention and remedial action to gear up the quality of education and hence promote capability for research: (i) A dynamic and updated syllabus encompassing modern developments in the subject. (ii) A good teacher who can teach the subject with practical case studies, where needed, to catalyse research aptitudes of young minds. (iii) A select band of students carefully chosen solely on their subject knowledge and research aptitude.

These needs are inter-dependent and currently, this inter-dependence is in disarray. The result is a haphazard combination of the three elements.

Since research and teaching are integrated in the system, adequate scientific infrastructure and environment are essential for quality research. This is an area of crucial concern. Often funds are released from projects for purchase of high-tech instruments, particularly in areas concerning molecular biology and biotechnology. But no provision is made for necessary infrastructure required for their efficient use like the supply of uninterrupted power, water and chemicals, appropriate funds for maintenance and upkeep of equipments, for example. The recipient institutions, though are supposed to provide for them, many times do not do so due to paucity of funds. It is therefore not uncommon to come across equipments stacked idle and at times, unopened even!

Thus research, with its modern ramification, finds itself as a square peg in a round hole. It is high time we recognize the maladies and provide a smooth path for purposeful research through an intensive malady–remedy analysis. Nothing substantial would accrue by sheer criticism and crying hoarse for quality research.

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